



CITY OF CINCINNATI

# **CLIMATE PROTECTION ACTION PLAN**

## **The Green Cincinnati Plan**

**June 19, 2008 (Version 4.0)**



**Office of Environmental Quality**

**Two Centennial Plaza  
805 Central Avenue, Suite 320  
Cincinnati, OH 45202  
Phone (513) 352-6991**

**<http://www.cincinnati-oh.gov/cmqr/pages/-17659-/>**

<b>Table of Contents .....</b>	<b>1-3</b>
<b><u>Introduction.....</u></b>	<b>4-9</b>
<b><u>Executive Summary .....</u></b>	<b>10-13</b>
<b><u>Cincinnati's Greenhouse Gas (GHG) Emissions Inventory.....</u></b>	<b>14-17</b>
<b><u>Cincinnati's Emission Reduction Goals.....</u></b>	<b>18-19</b>
<b><u>Emissions Reduction Measures .....</u></b>	<b>20-23</b>
<u>Transportation Task Team Recommendations .....</u>	24-25
<u>Energy Task Team Recommendations .....</u>	26-29
<u>Waste Task Team Recommendations .....</u>	30-31
<u>Land Use Task Team Recommendations .....</u>	32-33
<u>Advocacy Task Team Recommendations .....</u>	34
<u>Food Related Recommendations .....</u>	35
<b><u>Discussion of Recommended Actions.....</u></b>	<b>36-37</b>
<b><u>Implementation Plan – How do we make sure it all happens? .....</u></b>	<b>38-39</b>
<b><u>Lead Implementation Responsibilities .....</u></b>	<b>40-42</b>
 <b>Appendix</b>	
<u>Greenhouse Gas Emissions Inventory Data Sources .....</u>	43-45
<u>Transportation Appendix .....</u>	46-77
<u>TTT1 - Hybrid Buses .....</u>	47-48
<u>TTT2 - City of Cincinnati Fleet Fuel Efficiency .....</u>	49-51
<u>TTT3 - The Cincinnati Streetcar .....</u>	52-54
<u>TTT4 - Expanded City Bus Service .....</u>	55-56
<u>TTT5 - Shared Car Service .....</u>	57-59
<u>TTT6 - Green Locomotives .....</u>	60
<u>TTT7 - Electric Car Dealership .....</u>	61-62
<u>TTT8 - Idle Reduction Campaign .....</u>	63
<u>TTT9 - Increase Bicycle Use .....</u>	64-66
<u>TTT10 - RideShare Program .....</u>	67-68
<u>TTT11 - Improved Community Fuel Efficiency .....</u>	69-70
<u>TTT12 - Complete Streets .....</u>	71-72
<u>TTT13 - Regional Light Rail Plan .....</u>	73-74
<u>TTT14 - Regional Bus Service Expansion .....</u>	75-76
<u>TTT15 - The Ohio Hub Plan .....</u>	77
<u>Energy Appendix .....</u>	78-145
<u>ETT1A1 - Residential Energy Efficiency.....</u>	79-80
<u>ETT1A2 - Programmable Thermostats.....</u>	81-82
<u>ETT1A3 - Cold Water Washing .....</u>	83-84

Table of Contents (continued)

## Energy Appendix – Continued

<a href="#"><u>ETT1A4 - Air-Dry Dishes</u></a> .....	85-86
<a href="#"><u>ETT1A5 - Water Heater Blanket</u></a> .....	87
<a href="#"><u>ETT1A6 - Energy Star For Residential Construction</u></a> .....	88-89
<a href="#"><u>ETT1A7 - Free Compact Fluorescent Light Bulbs</u></a> .....	90
<a href="#"><u>ETT1A8 - “Green Loan” Home Financing</u></a> .....	91-92
<a href="#"><u>ETT1A9 - Photovoltaic Energy</u></a> .....	93-94
<a href="#"><u>ETT1A10 - Solar Thermal Residential</u></a> .....	95-96
<a href="#"><u>ETT1B1 - Educational Outreach</u></a> .....	97-98
<a href="#"><u>ETT1B2 - Contractor Training Program</u></a> .....	99-100
<a href="#"><u>ETT1B3 - Cincinnati Conservation Corps</u></a> .....	101
<a href="#"><u>ETT1C1 - Grant for Low Income</u></a> .....	102-103
<a href="#"><u>ETT1C2 - Best Practices – Residential</u></a> .....	104
<a href="#"><u>ETT1C3 - Amended LEED Tax Abatement</u></a> .....	105-106
<a href="#"><u>ETT1C4 - Building Performance Disclosures</u></a> .....	107-109
<a href="#"><u>ETT1C5 - State and Federal Policy Action</u></a> .....	110-111
<a href="#"><u>ETT2A1 - LEED Certification for the Banks Riverfront Development</u></a> .....	112-113
<a href="#"><u>ETT2A2 - Cincinnati Public Schools Energy</u></a> .....	114
<a href="#"><u>ETT2A3 - Expand Green Cincinnati Program</u></a> .....	115-116
<a href="#"><u>ETT2A4 - High Solar Reflectance Roofs</u></a> .....	117
<a href="#"><u>ETT2A5 - More Efficient Street Lighting</u></a> .....	118-119
<a href="#"><u>ETT2A6 - Bus Passes For City Employees</u></a> .....	120
<a href="#"><u>ETT2A7 - Commercial Building Code Upgrades</u></a> .....	121-123
<a href="#"><u>ETT2A8 - Photovoltaic Energy</u></a> .....	124
<a href="#"><u>ETT2A9 - Energy Efficiency for Commercial and Industrial Bldgs and Fac.</u></a> .....	125-126
<a href="#"><u>ETT2B1 - Upgrade Website</u></a> .....	127-128
<a href="#"><u>ETT2B2 - Easy Read Electric Meters</u></a> .....	129
<a href="#"><u>ETT2B3 - CFLs For Kids</u></a> .....	130
<a href="#"><u>ETT2B4 - Green For All Work Force</u></a> .....	131
<a href="#"><u>ETT2C1 - Best Practices – Business</u></a> .....	132
<a href="#"><u>ETT2C2 - Right Of Way Utility And Street Work Coordination</u></a> .....	133-134
<a href="#"><u>ETT2C3 - No To Low Volatile Organic Compound Coatings</u></a> .....	135
<a href="#"><u>ETT2C4 - Best Practices – Government</u></a> .....	136
<a href="#"><u>ETT2C5 - Green Permitting</u></a> .....	137
<a href="#"><u>ETT2C6 - Building Design Award Program</u></a> .....	138-139
<a href="#"><u>ETT2C7 - Greenlight Districts</u></a> .....	140-141
<a href="#"><u>ETT2C8 - Carbon Offset Commission</u></a> .....	142
<a href="#"><u>ETT2C9 - Electricity Generation</u></a> .....	143-144
<a href="#"><u>ETT2C10 - State &amp; Federal Policy</u></a> .....	145

Table of Contents (continued)

<u>Waste Appendix</u> .....	146-171
<u>WTT1 - Cart-based recycling program</u> .....	147-149
<u>WTT2 - Environmentally Preferable Purchasing</u> .....	150-152
<u>WTT3 - Commercial Recycling</u> .....	153-156
<u>WTT4 - Reuse Network</u> .....	157
<u>WTT5 - Electronics Recycling</u> .....	158-160
<u>WTT6 - Foodwaste Composting</u> .....	161-164
<u>WTT7 - Pay-as-you-throw</u> .....	165-169
<u>WTT8 - RecycleBank</u> .....	170-171
 <u>Land Use Appendix</u> .....	 172-200
<u>LTT1A - Construction Industry Best Practices</u> .....	173
<u>LTT1B - Land Use Control and Planning Techniques</u> .....	174-177
<u>LTT2 - Forest Carbon Sequestration</u> .....	178-179
<u>LTT3 - Sustainable Community Agriculture</u> .....	180-181
<u>LTT4 - Implement Industrial Best Management Practices</u> .....	182-183
<u>LTT5 - Environmental Literacy</u> .....	184-186
<u>LTT6A - Incentives to Promote Mixed Use Development Patterns</u> .....	187-191
<u>LTT6B - Improved Integration of Mass Transit</u> .....	192
<u>LTT6C - Relax Minimum Parking Requirements</u> .....	193-196
<u>LTT7 - Create Regional Trail System</u> .....	197-198
<u>LTT8 - Regional Land Use Plan</u> .....	199-200
<u>LTT9 - Redevelop Brownfields</u> .....	201-202
 <u>Advocacy Appendix</u> .....	 203-207
<u>ATT1 - Hold Climate Summit</u> .....	204
<u>ATT2 - Create Multi-layered Marketing Plan/Plans doe GHG Reductions</u> .....	205-206
<u>ATT3 - Develop Public Education Program</u> .....	207
 <u>Food Appendix</u> .....	 208-211
<u>F1 - Reduced Meat Consumption</u> .....	209-211

## Introduction

*“When one door closes another door opens; but we so often look so long and so regretfully upon the closed door, that we do not see the ones which open for us.” - Alexander Graham Bell*

Background – You’ve seen and heard about it everywhere, from the media and the scientists to celebrities and your own family members. Earth’s climate is changing, and we all are to blame. All over the planet, people are realizing that action is needed to stabilize the Earth’s climate, and people are responding, not only by changing their own conduct, but also by working through their institutions to ensure that those institutions change. Cities, counties, states, corporations, non-profit organizations, and even Nations are scrutinizing their activities, and charting a new path forward. Cincinnati is one of more than 780 U.S. Cities that has committed to reducing its contribution to global climate change. Fortunately, the more we learn about how to combat climate change, the more we realize that climate protection measures are mostly things that we have good reason to be doing anyway. Climate protection measures can help conserve scarce natural resources, save money, enhance the local economy, improve air quality, create jobs, and improve public health. But as with so many things, there is more than one way to do it, and whether climate protection work helps or hurts our community depends on the paths that we choose.

Climate Protection 101 – When the sun’s rays enter Earth’s atmosphere, some of the energy is retained, and some bounces back into space. Certain chemicals in the atmosphere cause more of the sun’s energy to be retained, in the same way that the pane of glass on a greenhouse causes some of the sun’s energy to be retained inside the greenhouse. Chemicals that behave in this way are called greenhouse gasses (GHG). Human activity releases large quantities of certain greenhouse gasses into the atmosphere. The most significant of these human produced GHGs is carbon dioxide, also called CO<sub>2</sub>. Fossil fuels, including coal, oil, gasoline, diesel, and natural gas are composed primarily of carbon. When fossil fuels are burned, the carbon is converted into CO<sub>2</sub>. The majority of GHG emissions caused by humans come from the burning of fossil fuels.

A variety of gasses contribute to the greenhouse effect, and each of these gasses has a different “potency.” For ease of discussion, and computation, emissions of these various gases are commonly converted into the equivalent quantity of CO<sub>2</sub>, and are referred to as CO<sub>2</sub>equivalents or CO<sub>2</sub>e, which is sometimes further shortened to “Carbon” or CO<sub>2</sub>. In this report anytime we quantify carbon or CO<sub>2</sub>, we are actually referring to CO<sub>2</sub>e, the combined effects of all GHGs.

Cincinnati’s Climate Protection Process – In September of 2007, Mayor Mark Mallory introduced the motion for the City of Cincinnati to undertake a public climate protection planning process. The directive, unanimously passed by City Council, called upon the city Administration to establish goals for significantly reducing regional greenhouse gas emissions while preserving both economic development and transportation options throughout the region. Furthermore, the Administration would develop a Climate Action Plan, with significant input from the community, to implement those goals. Mayor Mallory then created the Climate Protection Steering Committee to assist the Administration with the development of the plan and appointed Vice Mayor David Crowley as Chair. Members included representatives of Cincinnati’s business, government, environmental, academic, and civic organizations. The Steering Committee formed 5 Task Teams of more than 150 subject matter experts and concerned citizens in the areas of Energy, Transportation, Land Use, Waste Management and Advocacy. The Climate Protection Task Teams have compiled lists of hundreds of possible actions that could be taken in Cincinnati to reduce greenhouse gas (GHG) emissions. These possible actions have been researched and screened to develop the list of recommendations contained in this document. Additional input was received at a public hearing held on February 25, 2008. Approximately 100 people attended and 20 gave testimony.

Introduction (continued)

Screening Criteria – In evaluating GHG reduction measures, the following criteria were used:

- 1) GHG Reductions – How much would the proposal reduce Cincinnati’s GHG emissions?
- 2) Economic Cost or Benefit – Over the life of the proposed measure, what is the economic cost or benefit of the proposed measure, and what is the cost or benefit for each ton of GHG saved?
- 3) Sustainability – Does the proposal add or detract from Cincinnati’s long term sustainability? Sustainability is evaluated in terms of its impact on the triple bottom line – the environment, the people, and the economy of Cincinnati.
- 4) Other important goals and objectives – While largely covered by the sustainability criterion, the evaluation of each proposal included consideration of whether the proposal helped or hurt in the achievement of a wide range of local objectives.

Input Requested – Cincinnati welcomes input on this Climate Action Plan. We want to know what you like, what you don’t like, and how the plan can be improved. We also want to know what involvement you would like to have in implementing the Climate Action Plan. You can email your input to [oeq@cincinnati-oh.gov](mailto:oeq@cincinnati-oh.gov).

Credits – The support and assistance of the following individuals is gratefully acknowledged.

**Climate Protection Steering Committee Members**

*Chair* – Vice Mayor David Crowley  
 David Altman, Attorney  
 Willie Carden, Cincinnati Parks Department  
 Cathy Crain, Greater Cincinnati Foundation  
 Carl Evert, Professor Emeritus of Electrical Engineering – University of Cincinnati  
 Ned Ford, Sierra Club  
 Allan Harris, National Technical Association  
 Greg Hutzler, Green Building Council  
 Brad Mank, Environmental Advisory Council  
 Sandra Meyer, Duke Energy  
 Dan Oerther, University of Cincinnati  
 Tony Parrott, Metropolitan Sewer District  
 David Pepper, Hamilton County Commissioner  
 John Rademacher, American Institute of Architects  
 Jim Reid, Greater Cincinnati Building Trades Council  
 Michael Setzer/Marilyn Shazor, SORTA  
 Tim Swords, GE Aviation  
 Ellen van der Horst, Cincinnati USA Regional Chamber  
 Ex Officio Brewster Rhodes, Governor's Office  
 Ex Officio Carla Walker, Mayor’s Office

Introduction (continued)**Climate Protection Task Teams Members**Advocacy Team Members

*Chair* – Linda Holterhoff, Keep Cincinnati Beautiful  
*Staff* - Jack Rennekamp, MSD  
Karen Anderson, Kanet Advertising  
Melinda Dietrich, Master Gardener for Hamilton County  
Jenny Edwards  
Melissa English, Ohio Citizens Action  
Nick Gotthardt  
Julie Idoine  
Charlie Kanet, Kanet Advertising  
Valerie Macarie, Cat Macarie Creative Solutions  
Tara Maddock, Mill Creek Watershed Council  
Dollie Moore  
Enid Nagel, Sierra Club  
Van Needham, Duke Energy  
Jacqueline Patterson, Toxicology Excellence for Risk Assessment  
Sara Phillips  
Mariann Quinn, Duke Energy  
John Rademacher, American Institute of Architects  
Mary Clare Rietz, Ohioans for Health, Environment and Justice  
Devin Schenk, Northern Kentucky University  
Marti Sinclair, Environmental Community Organization  
Bob Vickrey, City of Cincinnati Department of Transportation and Engineering  
Christl Wigner, Cincinnati Health Dept., Div. of Environmental Health Science

Energy - Conservation and Alternatives Team Members

*Chair* – Larry Feist, Cincinnati State Technical and Community College  
*Staff* - Cynthia Witte, City of Cincinnati – Public Services  
Doug Bell, Sierra Club  
Michael Bolan  
Andy Corn, RWA Architects, Inc./AIA-COTE  
Ankur Das  
Jeff Davis  
Denny Dellinger, Dellinger Architects  
Jack Dison, Procter & Gamble  
Sarah Drees  
Chris Dwyer, EmotivEnergy  
Carl Evert, Professor Emeritus of Electrical Engineering – University of Cincinnati  
John Fanselow, Third Sun Solar and Wind  
Mark Fisher, Cincinnati Zoo and Botanical Garden  
Ned Ford, Sierra Club  
Brian Garry, One Cincinnati  
Shawn Hesse, Emersion Design  
Greg Hutzel, BHDP/GBC  
James Kinsman, Green Energy Ohio

Introduction (continued)Energy - Conservation and Alternatives Team Members (continued)

Howard Konicov, The Synthesis Foundation  
John Stowell, Duke Energy  
Eric Kuhn, GAI Consultants  
Perry Leitner, Blue Chip Solar and Wind  
Jack Martin, City of Cincinnati, Department of Transportation and Engineering  
Jimi Merk  
Mariann Quinn, Duke Energy  
Gauray Shil, Trinity Consultants, Inc.  
Tom Smith  
Daniel Vinton, GE Aviation  
Ralph Wells, Cincinnati State Technical and Community College  
Thomas White

Land Use Team Members

*Chair* – Liz Blume, Xavier University  
*Staff* - Dave Gamstetter, City of Cincinnati Park Board  
Katherine Biederman, Cincinnati Waldorf School  
Katie Bollmer  
Paul Casper, Frost Brown Todd LLC  
Carla Chifos, University of Cincinnati School of Planning  
Eileen Enabnit, City of Cincinnati Department of Transportation and Engineering  
Linda Ford, Seven Hills School  
Steven Hawkins, ERM-Midwest  
Michael J. Luessen, ATC Associates Inc.  
Brad Mank, Environmental Advisory Council  
Sam McKinley, Sierra Club  
Geoff Milz  
Michael Moore, City of Cincinnati Department of Transportation and Engineering  
Jeanne Nightingale  
John Potter, Taft Stettinius Hollister LLP  
Shalmah Prince, East End Community  
Mark Quarry, Cincinnati Area Board of REALTORS ®  
Mary Roderick  
Sarch Saheb  
Sean Suder  
Betsy Townsend, Leave No Child Inside-Greater Cincinnati  
Aisha Tzillah, City of Cincinnati Department of Community Development  
Rick Schoeff, Environmental Advisory Council  
Margo Warminski  
Margaret Wuerstle, City of Cincinnati Department of Community Development

Transportation Team Members

*Chair* – Chris Moran, League of Women Voters  
*Staff* - Reggie Victor, City of Cincinnati Department of Transportation and Engineering  
*Staff* - Mel McVay, City of Cincinnati Department of Transportation and Engineering



Introduction (continued)Transportation Team Members (continued)

Martha Kelly, City of Cincinnati Department of Transportation and Engineering  
Cathleen Arnold, Sierra Club  
Blake Bartley  
Larry Bloomfield  
Joe Bowman, Sierra Club  
Bill Burwinkel, National Marketshare Group, Inc.  
Brian Coates, Cincinnati Police  
Rodney Crice, GAI Consultants  
Sarah Fry, OKI  
Haynes Goddard, University of Cincinnati  
Colin R. Groth, SORTA/Metro  
William D. Hayes, Vorys, Sater, Seymour and Pease LLP  
Dan Korman, Park + Vine  
Lashanna Martin  
Cindy Minter, HNTB  
William Messer, Environmental Advisory Council  
Tim Reynolds, Metro  
John Schneider, Alliance for Regional Transit  
Lauren Sullivan  
Elvira Teran  
Brad Thomas, Mayor's YPKC, Transportation Chair  
Heidi Trimarco, Taft Stettinius & Hollister LLP

Waste Team Members

*Chair* – Larry Fradkin, Future Enviroassets, LLC  
*Staff* - Holly Christmann, Hamilton County Environmental Services  
*Staff* - Michelle Balz, Hamilton County Environmental Services  
Jay Barkey  
Debbie Clark, Blue-Green Alliance  
Emily Rae Davies  
Diantha Decker, Mill Creek Watershed Council  
Anthony DiPuccio, SCS Engineers  
Ann Fallon, Cincinnati State Technical and Community College  
Karl R. Graham  
Mike Groh, Cognis, Oleochemicals LLC  
Marie Kocoshis  
Kurt Krahn, UC Graduate Planning Student  
William Jacoby, Cincinnati Health Department, Div. of Environmental Health Science  
Summer Jones, OKI  
Matthew Lafkas, Grant Thornton  
Norma Lewis, US EPA  
John Loper, Environmental Advisory Council and University of Cincinnati  
Karen Luken, RW Beck  
Denny Meyer, City of Cincinnati Public Services  
Jeanette Montour  
Margie Rothermich

Introduction (continued)

Waste Team Members (continued)

Eileen Schenk, Imago

Tom Turchiano, Rumpke Consolidated Companies

Joe Vogel, City of Cincinnati Department of Transportation and Engineering

Diantha Decker, Mill Creek Watershed Council

Greenhouse Gas Inventory

Hamilton County Department of Environmental Services

Office of Environmental Quality

Office of Environmental Quality

Larry Falkin, Director

Ginnell Schiller, Climate Protection Coordinator

Terri Howard, Administrative Specialist

## Executive Summary

The scientific community has become nearly unanimous in its conclusion that humans are causing significant changes to the Earth's climate, and that, unchecked, those climate changes can have catastrophic effects on humans and ecosystems. Cincinnati is committed to taking urgent action to reduce its contributions to global climate change. Cincinnati believes that, done wisely, the same actions that reduce GHG emissions can yield multiple benefits, including: cleaner air and water; improved public health; monetary savings; stronger local economy; and creation of good local jobs. Cincinnati is committed to acting in a way that produces all of these benefits simultaneously. This Climate Protection Action Plan (Plan) lays out a roadmap for how Cincinnati will act to reduce local GHG emissions.

Adoption of this Plan should be seen not as the final word on how Cincinnati will address global climate change, but as an agreement on the urgency of the problem, a consensus on the broad direction in which we should head, and commitment to a set of actions that will begin to make the desired changes. This Plan will be assessed and revised, as necessary, to keep Cincinnati on course toward achieving all of the multiple benefits set forth as the goals of this Plan.

### Cincinnati's Green House Gas Emissions Inventory

Greenhouse gas (GHG) emissions for the City of Cincinnati, and for Cincinnati's City Government, have been computed using the Clear Air and Climate Protection (CACP) software model developed by ICLEI. The CACP model is the one endorsed by the National Conference of Mayors and used by most cities and counties that have calculated their GHG emissions.

The City of Cincinnati produced approximately 8.5 million tons of CO<sub>2</sub> equivalents (CO<sub>2</sub>e) in 2006. At 25.5 tons per capita, Cincinnati is slightly higher than the national average emission rate of 24.5 tons. Cincinnati's emissions come from a wide variety of activities, which can be grouped into sectors. By sector, Cincinnati's GHG emissions come from: Commercial Buildings, 40.7%; Transportation, 26.6%; Residential Buildings, 18.6%; Industrial Operations, 15.6%; and Waste Disposal, -1.5%.

Cincinnati City Government produced 432,179 tons of GHG emissions in 2006, or approximately 5% of the total GHG emissions from the City. By far the largest contributors to these emissions were the water and sewer utilities, accounting for 69.5% of City Government's emissions. Other contributors to City Government's emissions included: City Buildings, 17.8%; Streetlights, 7.9%; and City Vehicles, 5.0%.

### Emission Reduction Goals

Cincinnati adopts the following GHG reduction goals:

- Short Term – Reduce GHG emissions 8% below 2006 levels by 2012.
- Medium Term – Reduce GHG emissions 40% below 2006 levels by 2028.
- Long Term – Reduce GHG emissions 84% below 2006 levels by 2050.

These goals, reflecting a commitment to reduce GHG emissions 2% per year starting immediately, apply to both Cincinnati City Government and to the Cincinnati Community (everything occurring within the geographical borders of the City of Cincinnati). The goals are based on 3 considerations: the level of reductions necessary to stabilize the Earth's climate at a tolerable level; the commitments being made by other cities and counties across the country and around the world; and the availability of practical, affordable emission reduction measures in Cincinnati that are consistent with the multiple objectives established for this effort.

Executive Summary (continued)

Using the goals stated above, and the emissions inventory data, it is possible to calculate a “carbon budget,” meaning the amount of emission reductions that must be achieved to meet the established goals. The carbon budget is set forth in the following table:

Year	Cincinnati Community	Cincinnati City Government
2006 Baseline	8.5 million tons	432,000 tons
2012 Reduction	680,000 tons	34,560 tons
2028 Reduction	3.4 million tons	172,800 tons
2050 Reduction	7.1 million tons	362,880 tons

**Emission Reduction Measures** -This report recommends more than 80 Emission Reduction Measures that together can reduce Cincinnati’s GHG emissions by the amounts called for in the carbon budget, stated above. The appendices to this report quantify the GHG reductions available from the Emission Reduction Measures, as well as up-front costs, life-cycle costs, and payback periods for investments. Unless a specific study is cited in the appendices, these figures should be regarded as first approximations. For Emission Reduction Measures involving substantial costs, these figures should be verified and refined prior to implementation. A summary of the data on each Emission Reduction Measure is presented in the table on pages 20-23.

**Emission Reduction Measures – Transportation**

Transportation accounts for 26.6% of Cincinnati’s GHG emissions. Emissions from transportation can be reduced by decreasing the number of vehicle miles traveled (VMT), improving the fuel economy of vehicles, and reducing the carbon content of fuels. Cincinnati will use all 3 of these strategies. Emission reduction measures that reduce VMT include improvements to mass transit, promotion of bicycling, walking, and other modes of non-vehicular travel, and land use strategies that move people closer to their destinations and closer to transit facilities. Emission reduction measures that improve fuel economy include promoting hybrid electric vehicles, encouraging the purchase and use of fuel efficient vehicles, and encouraging the use of vehicles in a fuel efficient manner. Emission reduction measures that reduce the carbon content of fuel include promoting electric vehicles and other alternative fuel vehicles, although the use of fuels derived from food crops (corn based ethanol and soy based biodiesel) has not been endorsed.

**Emission Reduction Measures – Energy**

The use of energy in buildings accounts for nearly 75% of Cincinnati’s GHG emissions. The majority of these emissions are due to use of electricity, which has a larger GHG impact in Cincinnati than in many other communities because Cincinnati is heavily dependent on coal for generation of its electricity. Major strategies for reducing GHG emissions due to buildings include implementing energy efficiency measures, installing distributed renewable energy production capacity, and reducing emissions associated with the centralized production of electricity.

Efficiency measures include both behavior changes (e.g. accepting cooler winter temperatures and warmer summer temperatures) and structural changes (e.g. constructing more energy efficient new buildings and retrofitting existing buildings for energy efficiency). Distributed renewable energy systems include solar thermal, solar electric, geothermal, and other technologies that can be installed on virtually any building, whether residential, commercial, or industrial. Emissions associated with the centralized production of electricity can be reduced by using more renewable energy (wind, biomass, etc.), increasing efficiency through Combined Heat and Power projects, and developing cleaner coal technologies, including use of carbon capture and sequestration systems. Recommendations from the Energy Task

### Executive Summary (continued)

Team are divided into residential and commercial categories. They are further divided based on whether the GHG emission reductions were quantifiable, with a separate section for policy recommendations that would facilitate GHG reductions.

#### **Emission Reduction Measures – Waste**

Disposal of wastes and the resulting emission of methane from landfills, constitutes only a tiny percentage of Cincinnati's GHG emissions. This is due, in part, to the comprehensive methane capture and reuse system at Rumpke Landfill. However, by utilizing resources that are currently being landfilled, Cincinnati can dramatically reduce the City's GHG emissions. This is true because discarded products have imbedded energy, the energy that was used to manufacture the product, and much of this energy is recaptured when a product is recycled. The productive recycling or reuse of materials currently being landfilled may provide as much as 40% of the GHG emission reductions achieved in the early years of the Climate Protection Action Plan. Key strategies will include incentives for higher participation levels for commercial and residential recycling, and development of infrastructure to reuse currently unusable components of the waste stream, such as a composting facility for food waste.

#### **Emission Reduction Measures – Land Use**

Higher density, more compact mixed-use development patterns can offer significant reductions in GHG emissions due to 3 complementary effects: (1) reduced vehicle miles of travel, (2) improved heating and cooling efficiency, and (3) reduced municipal infrastructure requirements. Additional GHG reductions are available by adding trees, natural greenspaces, and sustainable urban agriculture to our existing communities. Trees and native plants capture carbon dioxide from the air and sequester the carbon in biomass and topsoil. Sustainable urban agriculture can sequester carbon, and also reduces local dependence on foods produced using energy intensive methods that are shipped for long distances prior to use. Promoting infill development, redeveloping brownfields, and enhancing our trail system to encourage walking and biking to destinations are all strategies that will lead to reduced GHG emissions.

#### **Emission Reduction Measures – Advocacy**

Many of the GHG reduction measures described above will rely in whole or in part on *voluntary* behavior changes on the part of Cincinnati's residents and businesses. Some of those changes will happen for economic reasons, such as people buying more fuel efficient cars and appliances due to rising energy prices. Some changes will be motivated by financial incentives, such as programs that incentivize the installation of renewable energy systems. In order to maximize the voluntary participation of people and businesses in GHG reduction measures, it is necessary to advocate change using two key strategies, (1) educate people about the importance of the choices they make that impact GHG emissions, and (2) aggressively promote the desired behavior. A multi-layered marketing plan and public education program will be used to promote GHG emission reductions. A Climate Summit will be used to bring in local partners to join in the promotional effort.

#### **Emission Reduction Measures - Food**

An increasing body of literature documents the GHG impact of food choices. Food issues were not researched or discussed extensively by any of the Task Teams that helped to prepare this Plan. A Task Team should be formed to give further consideration to food related issues and prepare recommendations for inclusion in a subsequent edition of this report. An Emission Reduction Measure encourages voluntary reductions in meat consumption, documenting significant GHG reductions available from relatively small dietary shifts.

Executive Summary (continued)**Discussion of Emission Reduction Measures**

The Emission Reduction Measures recommended in this plan were selected from a wide range of available options based on several criteria. To the extent possible, the plan relies on: (1) voluntary rather than regulatory approaches; (2) actions that, over their lifecycle, save more money than they cost; and (3) actions that advance multiple local objectives, such as improving air and water quality, creating local jobs, improving the region's economic competitiveness, and conserving natural resources.

Some of the recommendations in this report are fully researched and ready to implement, while others are documented only well enough for a first assessment of their desirability. The chart on page 20-23 identifies which recommendations are ready for implementation, and which recommendations will require additional research prior to implementation.

Many of the actions recommended in this plan will require some initial investment, followed by savings that more than pay back the investment over time. A full economic analysis of each of the actions recommended in this plan was beyond the scope of this effort; however, to the extent possible, a first approximation of start-up costs, lifecycle costs, and payback period for the initial investment has been included.

**Implementation**

The implementation phase of the City's climate protection effort will be lead by a Steering Committee, closely resembling the Steering Committee that has lead the planning phase. For each recommended action, an entity will be identified willing to spearhead implementation. The lead entity could be an individual, a City department, a business, or an organization, depending on the nature of the action being implemented. A staffing level of at least 2 people will be needed to facilitate implementation of this Plan. The current temporary Climate Protection Coordinator position should be maintained by the City through the end of 2008, and 2 permanent positions should be created in the City's FY09 budget process. A portion of the funding needed for implementation should be provided through the City's budget process, with additional funding coming from private investors, state and federal programs, and various grant opportunities. The Steering Committee will be responsible for preparing an annual progress report and providing status reports to City Council. The Climate Protection Action Plan will be revised and updated as necessary to keep it current.

## Greenhouse Gas Emissions Inventory

The Climate Protection Planning Process includes development of a Greenhouse Gas (GHG) Emissions Inventory. The purpose of the inventory is to establish a baseline. The reduction measures can then be compared against the reduction goals to determine if those goals are being achieved. Additionally, comparing the inventory to other benchmarks, for example, national averages or indexes derived from other cities or communities, allows a relative performance measure. Lastly, it provides some strategic insight into those areas offering the greatest opportunity for improvement.

The methodology employed for the inventory was the Clear Air and Climate Protection (CACP) software model created for the International Council for Local Environmental Initiatives (ICLEI<sup>1</sup>.) The model covers Greenhouse Gases (carbon dioxide, methane, nitrous oxide) and criteria air pollutants (NOx, SOx, carbon monoxide, volatile organic compounds, PM10) associated with electricity and fuel use and waste disposal. The inventory quantifies GHG emissions for Cincinnati government activities and those for the Cincinnati community at large. The baseline year for analysis is 2006, the most recent year for which reliable data was available. The model incorporates energy consumption data for a multitude of sources including electricity, natural gas, propane, vehicle fuels, etc.

### Cincinnati Community Results

Community results indicate that total emissions were approximately 8.5 million tons of carbon dioxide equivalent<sup>2</sup> for 2006. This equated to 25.5 tons per capita, (based on a 2005 population of 331,283) slightly above the national average of 24.5 tons. On a sector basis, buildings and facilities were the largest producers of emissions with the commercial buildings and facilities accounting for 10.4 tons per person, residential 4.7 tons, and industrial 4.0 tons. The Transportation Sector accounted for 6.8 tons.

The emissions from the waste sector, due to the methane recovery systems in use, were inconsequential. However, waste management improvements can significantly reduce Cincinnati's GHG emissions because, although the considerable energy imbedded in the waste itself is not counted in the baseline inventory, it is counted when saved by a GHG reduction measure. Similarly, carbon sequestered by our existing trees and agricultural practices are not included in the baseline, but increases in carbon sequestration resulting from GHG reduction measures are counted.

Buildings and facilities accounted for nearly 75% of all emissions but 58% of the energy consumed. The Commercial sector was the most carbon intensive representing about 40% of GHG although only 26% of energy. Transportation was 26% of emissions but 42% of the energy. See chart on next page.

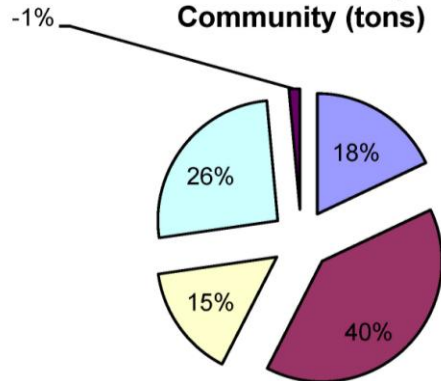
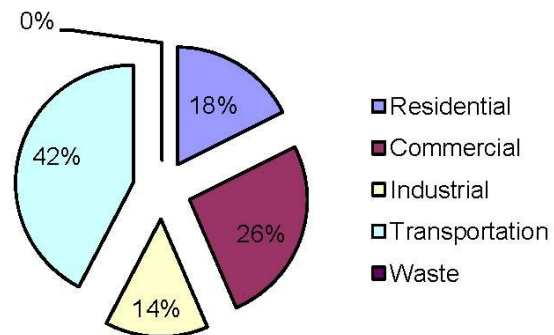
<sup>1</sup> **ICLEI—Local Governments for Sustainability** ICLEI, founded in 1990 is an international association of local governments and national and regional local government organizations that have made a commitment to sustainable development. More than 700 cities, towns, counties, and their associations worldwide comprise ICLEI's growing membership. ([www.ICLEI-USE.org](http://www.ICLEI-USE.org))

<sup>2</sup> For convenience, emissions of various GHGs are converted into an equivalent quantity of CO<sub>2</sub> using weighting factors established by EPA for the greenhouse "potency" of various gasses. In shorthand, these carbon dioxide equivalents are sometimes referred to as CO<sub>2</sub>e, or simply as "CO<sub>2</sub>" or "carbon".

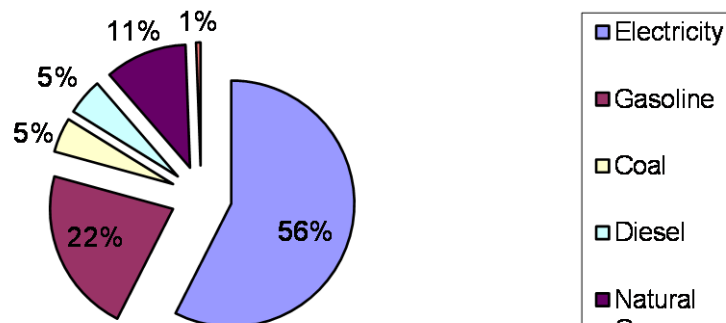


Greenhouse Gas Emissions Inventory (continued)

	Equiv CO <sub>2</sub> (tons)	Equiv CO <sub>2</sub> (%)	Energy (MMBtu)
Residential	1,571,402	18.6	10,914,010
Commercial	3,449,658	40.7	16,076,400
Industrial	1,324,883	15.6	8,766,809
Transportation	2,251,539	26.6	26,257,131
Waste	-127,005	-1.5	
<b>Total</b>	<b>8,470,477</b>	<b>100.00</b>	<b>62,014,351</b>

**2006 GHG Emissions By Sector - Community (tons)****2006 Energy Consumption By Sector - Community (MMBtu)**

In terms of emissions by source, electricity accounted for 56% of all emissions, gasoline 22%, natural gas 11%, and coal and diesel, 5% each. Other sources, including propane and fuel oil, accounted for 1%.

**2006 CO<sub>2</sub> Emissions By Source - Community (tons)**



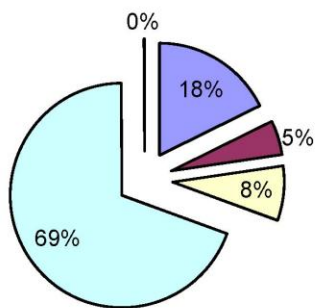
Greenhouse Gas Emissions Inventory (continued)City of Cincinnati Government Results

The GHG emissions for City Government, at 432K tons, accounted for approximately 5% of the Community's emissions. The operations analyzed included all buildings/facilities, traffic lights and streetlights, the vehicle/equipment fleet, water and sewage operations, and waste.

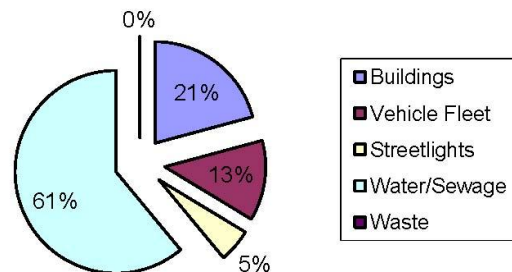
As expected, the water and sewage operations represented the vast majority of both the energy consumed and GHG emissions, 61% and 69%, respectively. The buildings/ facilities category was second with almost 18% of emissions. Traffic lights and streetlights (8%) actually contributed more GHGs than the entire City vehicle and equipment fleet (5%). Like the community analysis, the emissions from generated waste were inconsequential.

	Equiv CO <sub>2</sub> (tons)	Equiv CO <sub>2</sub> (%)	Energy (MMBtu)
Buildings	76,807	17.8	414,222
Vehicle Fleet	21,453	5.0	254,569
Streetlights	34,064	7.9	105,919
Water/Sewage	300,363	69.5	1,214,160
Waste	-508	-0.1	
Total	432,179	100.00	1,988,871

**2006 GHG Emissions By Sector  
Government (tons)**



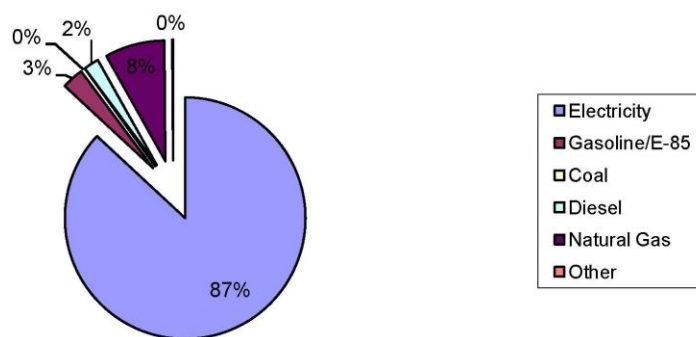
**2006 Energy Consumption By Sector  
Government (MMBtu)**



Greenhouse Gas Emissions Inventory (continued)

In terms of emissions by source, electricity accounted for 87% of all emissions, natural gas 8%, gasoline 3%, and diesel 2%.

**2006 GHG Emissions By Source - Government (tons)**



A listing of data sources for the GHG Inventory analysis is located in Appendix I.

## Cincinnati's Emission Reduction Goals

The Climate Protection Steering Committee recommends that Cincinnati should set a short term, medium term, and long term goal for green house gas (GHG) emission reductions. The recommendation is:

- Short Term - Reduce GHG emissions 8% below 2006 levels by 2012
- Medium Term - Reduce GHG emissions 40% below 2006 levels by 2028
- Long Term – Reduce GHG emissions 84% below 2006 levels by 2050

These emission reduction goals call for reductions in Cincinnati's GHG emissions of 2% per year, starting immediately, and continuing until 2050.

Three key factors influenced the selection of Emission Reduction Goals for Cincinnati:

- 1) Scientific studies quantifying the emission reductions needed to stabilize the Earth's climate at a tolerable level.
  - a) The group Combat Climate Change has determined that the global temperature rise must be held to no more than 2°C to keep climate change impacts at a tolerable level. Combat Climate Change ([www.combatclimatechange.org](http://www.combatclimatechange.org)) is a Business Leaders' Initiative composed of 46 large companies from 11 countries, including Duke Energy and General Electric.
  - b) The U.N.'s International Panel on Climate Change (IPCC [www.ipcc.ch](http://www.ipcc.ch)) says that to limit global temperature increases to 2-2.4°C, global GHG emissions must peak no later than 2015, and be reduced 50-85% by 2050. It is probably not possible to keep the global temperature rise to less than 2°C.
- 2) Comparisons to goals being established by Cities, Counties and States across the country.
  - a) Many entities, including Hamilton County and the Cool Counties initiative, have adopted the goal of reducing emissions 2% per year, and at least 80% by 2050.
- 3) Availability of practical, affordable emission reduction measures in Cincinnati which are consistent with other local objectives.
  - a) This report contains recommendations that collectively are anticipated to achieve 100% of the proposed emission reduction goals for City Government and the broader community for 2012 and 2028. While the chart on page 20-23 quantifies only 45% to 96% of the emission reductions needed to meet the reduction goals, 30 of the recommendations in this report have yet to be fully quantified. In addition, City Government has major improvements underway that will significantly reduce GHG emissions that are not quantified in this report.

**Base Year Determination** – The Climate Protection Steering Committee has received a preliminary recommendation that the City should use 2006 as its base year for setting emission reduction goals and calculating emission reductions. This recommendation is based primarily on the inability to obtain data necessary to complete an emissions inventory for any prior year. Some organizations that began their climate protection efforts a number of years ago are using 1990 or 2000 as their base year. It would be desirable to use 1990 as the base year because that is the base year for the Kyoto Protocol. However, the risk of error in back-projecting a 1990 or 2000 emission level based on 2006 data is judged to outweigh the advantages of having data comparable to early-acting entities.

Cincinnati's Emission Reduction Goals (continued)Carbon Budget

Based on the Emissions Inventory which has quantified Cincinnati's GHG emissions at 8.5 million tons per year, the reduction goal would be:

**Emission Reduction Goals**

Year	Cincinnati Community	Cincinnati City Government
2006 Baseline	8.5 million tons	432,000 tons
2012 Reduction	680,000 tons	34,560 tons
2028 Reduction	3.4 million tons	172,800 tons
2050 Reduction	7.1 million tons	362,880 tons

Emission Reduction Measures

#	Name	City Gov 2012	Comm 2012	City Gov 2028	Comm 2028	Cost	LC Cost	Cost/Ton	Pay Back Period	Sust. & Other Goals	Recommendation
TTT1	Hybrid Transit Busses	0	1,637	0	12,771	6,000,000	0	0	10-12 yrs	+	Implement (I)
TTT2	Cincinnati Fleet Fuel Efficiency	669	669	803	803	2,407,130	0	0	5-7 yrs	0	I
TTT3	Streetcar	0	4,300	0	28,068	182,000,000	0	0	10-12 yrs	++	S
TTT4	Expanded City Bus Service	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	+	Further Study S)
TTT5	Shared Car Service	0	1,000	0	5,000	1,000,000	0	0	2-4 yrs	+	S
TTT6	Green Locomotives	0	2,168	0	2,168	12,000,000	0	0	7-10 yrs	0	I
TTT7	Electric Car Dealership	52	1,047	277	5,534	250,000	0	0	3-5 yrs	+	I
TTT8	Idle Reduction Campaign	0	78	0	78	0	0	0	0	+	I
TTT9	Increase Bicycle Use	0	6,300	0	6,300	0	0	0	0	+	I
TTT10	Rideshare Program	100	4,010	100	4,010	0	0	0	0	0	I
TTT11	Improved Fuel Efficiency	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	0	S
TTT12	Complete Streets	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	++	I
TTT13	Regional Light Rail	0	0	0	97,921	30,000,000	TBD	NA	TBD	++	S
TTT14	Regional Bus Service Expansion	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	+	S
TTT15	Ohio Hub Rail	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	+	S
ETT1A-1	Residential Energy Efficiency	0	10,200	0	10,200	1,510,000	0	0	< 1 yr	++	I
ETT1A-2	Programmable Thermostats	0	35,000	0	35,000	1,500,000	0	0	< 1 yr	++	I
ETT1A-3	Cold Water Wash	0	1,314	0	1,314	0	0	0	0	++	I
ETT1A-4	Air Dry Dishes	0	1,952	0	1,952	0	0	0	0	++	I
ETT1A-5	Water Heater Blanket	0	6,417	0	6,417	750,000	0	0	< 1 yr	++	I
ETT1A-6	Energy Star Residential Construction	0	500	0	2,500	0	0	0	< 1 yr	++	I
ETT1A-7	Free CFLs	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	S

## Emission Reduction Measures (continued)

#	Name	City Gov 2012	Comm 2012	City Gov 2028	Comm 2028	Cost	LC Cost	Cost/Ton	Pay Back Period	Sust. & Other Goals	Recommendation
ETT1A-8	Green Loan	0	18,000	0	90,000	0	0	0	7-10 yrs	++	I
ETT1A-9	Photovoltaics	25	500	10,000	198,326	800,000	0	0	10-12 yrs	++	I
ETT1A-10	Solar Thermal Res.	0	11,476	0	57,380	6,000,000	0	0	7-10 yrs	++	I
ETT1B-1	Educational Outreach	N/A	N/A	N/A	N/A	TBD	N/A	N/A	N/A	++	I
ETT1B-2	Contractor Training	N/A	N/A	N/A	N/A	TBD	N/A	N/A	N/A	++	I
ETT1B-3	Conservation Corp	N/A	N/A	N/A	N/A	0	0	N/A	N/A	++	I
ETT1C-1	Low Income Grant	N/A	N/A	N/A	N/A	TBD	TBD	N/A	N/A	TBD	S
ETT1C-2	Best Practices – Residential	N/A	N/A	N/A	N/A	0	0	N/A	N/A	++	I
ETT1C-3	LEED Tax Abatement	N/A	N/A	N/A	N/A	50,000	N/A	N/A	N/A	++	I
ETT1C-4	Bldg Performance Disclosure	N/A	N/A	N/A	N/A	TBD	TBD	N/A	N/A	0	S
ETT1C-5	State & Fed Policy Action	N/A	N/A	N/A	N/A	TBD	TBD	N/A	N/A	++	S
ETT2A-1	Banks Project	0	6,043	0	6,043	0	0	0	7-10 yrs	++	I
ETT2A-2	Cincinnati Public Schools	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	++	S
ETT2A-3	Expand Green Cincinnati	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	S
ETT2A-4	High SRI	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	S
ETT2A-5	Streetlights	2,440	2,440	13,824	13,824	0	0	0	0	++	I
ETT2A-6	Bus Passes	2,163	2,163	2,163	2,163	162,000	0	0	< 1 yr	++	I
ETT2A-7	Community Building Codes	TBD	TBD	TBD	TBD	0	0	TBD	TBD	TBD	S
ETT2A-8	Solar Thermal Comm.	0	4,046	0	20,229	9,000,000	0	0	0	++	I
ETT2A-9	Energy Efficiency Comm/Indust Bldgs	9,500	190,000	47,700	954,000	TBD	TBD	TBD	TBD	++	S
ETT2B-1	Upgrade Website	N/A	N/A	N/A	N/A	0	0	N/A	N/A	++	I
ETT2B-2	Easy Read Meters	N/A	N/A	N/A	N/A	TBD	TBD	N/A	N/A	++	S
ETT2B-3	CFLs for Kids	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	++	S
ETT2B-4	Green for All	N/A	N/A	N/A	N/A	TBD	TBD	N/A	N/A	++	S
ETT2C-1	Best Practice - Business	N/A	N/A	N/A	N/A	0	0	N/A	N/A	++	I

## Emission Reduction Measures (continued)

#	Name	City Gov 2012	Comm 2012	City Gov 2028	Comm 2028	Cost	LC Cost	Cost/Ton	Pay Back Period	Sust. & Other Goals	Recommendation
ETT2C-2	Street Work Coordination	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	++	S
ETT2C-3	No VOC Coatings	TBD	TBD	TBD	TBD	0	0	TBD	TBD	++	I
ETT2C-4	Best Practices - Govt	N/A	N/A	N/A	N/A	0	0	N/A	N/A	++	I
ETT2C-5	Green Permitting	N/A	N/A	N/A	N/A	TBD	TBD	N/A	N/A	++	S
ETT2C-6	Design Awards	N/A	N/A	N/A	N/A	0	0	N/A	N/A	++	I
ETT2C-7	Greenlight District	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	S
ETT2C-8	Carbon Offset Commission	N/A	N/A	N/A	N/A	0	0	N/A	N/A	++	S
ETT2C-9	Electricity Generation	TBD	TBD	TBD	TBD	0	0	0	0	++	I
ETT2C-10	State & Federal Policy	N/A	N/A	N/A	N/A	TBD	TBD	N/A	N/A	++	S
WTT1	Recycle Carts	0	19,967	0	19,967	2,800,000	0	0	10-15 yrs	++	I
WTT2	Buy Green	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	++	S
WTT3	Commercial Recycling	TBD	130,000	TBD	130,000	69,000	0	0	< 1 yr	++	I
WTT4	Reuse Network	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	++	S
WTT5	E-Waste	0	153	0	153	900	900	6	N/A	++	I
WTT6	Foodwaste Compost	TBD	9,657	TBD	9,657	0	0	0	7-10 yrs	++	I
WTT7	PAYT	0	77,733	0	77,733	5,000,000	0	0	3-5 yrs	0	I
WTT8	Recyclebank	0	73,869	0	73,869	4,300,000	0	0	5-7 yrs	++	S
LTT1-A	Green Construction	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	++	S
LTT1-B	Green Development Regs	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	++	S
LTT2-A	Forest Carbon	1,220	1,596	2,439	3,192	123,000	123,000	TBD	TBD	++	I
LTT3	Community Agriculture	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	++	S
LTT4	Industrial BMPs	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	++	S
LTT5	Environmental Literacy	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	++	S
LTT6-A	Mixed Use/Cons. Planning	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	++	S
LTT6-B	Integrate Transit	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	++	S

Emission Reduction Measures (continued)

#	Name	City Gove 2012	Comm 2012	City Gov 2028	Comm 2028	Cost	LC Cost	Cost/To n	Pay Back Period	Sust. & Other Goals	Recom- mendatio n
LTT6-C	Reduced Parking	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	++	S
LTT7	Regional Trails	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	++	S
LTT8	Land Use Plan	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	++	S
LTT9	Brownfields	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	++	S
ATT1	Climate Summit	N/A	N/A	N/A	N/A	1,000	1,000	N/A	N/A	++	I
ATT2	Marketing Plan	N/A	N/A	N/A	N/A	TBD	TBD	N/A	N/A	++	I
ATT3	Public Education	N/A	N/A	N/A	N/A	TBD	TBD	N/A	N/A	++	I
F-1	Reduced Meat Consumption	0	26,400	0	52,800	0	0	0	0	++	S
	<b>Totals</b>	<b>16,169</b>	<b>650,635</b>	<b>77,306</b>	<b>1,929,372</b>						

Target	34,560	680,000	172,800	3,400,000
--------	--------	---------	---------	-----------



## Transportation Task Team Recommendations

The Transportation Task Team (TTT) is focused on reducing GHG emissions with an interconnected transportation system that moves people and goods, using less fossil fuel and using fuel more efficiently. Strategies include short term recommendations that can be implemented within 3 to 5 years, as well as long term strategies that require longer timelines for planning and construction. Some proposals are based on specific local plans or studies that quantify emissions reductions, quantify economic costs and benefits, and document other benefits. Other proposals will need additional study regarding the costs and benefits of implementation.

There are several factors to consider when evaluating transportation proposals. The Transportation Task Team recommends expanding and implementing additional modes of public transit as an effective means of reducing CO<sub>2</sub> emissions. Public transportation reduces net CO<sub>2</sub> emissions by decreasing the number of vehicles on the street, and saves gasoline by decreasing congestion. In addition, public transit supports higher density land use that allows for fewer vehicle miles of travel (VMT).<sup>1</sup>

Implementing long term expansion initiatives similar to the Regional Rail Transit, Regional Bus Expansion and Ohio Hub proposals would greatly reduce CO<sub>2</sub> emissions. However, while there would be economic and non-economic benefits, the cost to implement the rail and bus expansion is high.

The following is a ranking of Transportation Task Team proposals, in order of best Sustainability/GHG Reduction solution to least, taking into account CO<sub>2</sub> reductions, cost and feasibility of implementation:

SHORT TERM - For more details on recommendation click on corresponding link.

- 1) [Hybrid Buses](#) – All Metro buses purchased in the future should be diesel-electric hybrids rather than standard diesel vehicles
- 2) [City of Cincinnati Fleet Fuel Efficiency](#) – The City of Cincinnati should commit to increasing the number of alternatively fueled vehicles in its fleet as outlined in a "Green Fleet" action plan.
- 3) [The Cincinnati Streetcar](#) – The City should construct the proposed Cincinnati Streetcar system, a fleet of electric powered streetcars that would operate along a 7.9 mile route between Downtown and Uptown.
- 4) [Expanded City Bus Service](#) – The City should support a major expansion of city bus service, similar to the expansion proposed in the MetroMoves plan
- 5) [Shared Car Service](#) – The City should assess the feasibility of attracting a “shared car service” to Cincinnati.
- 6) [Green Locomotives](#) – The City should support the conversion of existing railroad locomotives to “Genset” locomotives.
- 7) [Electric Car Dealership](#) – The City should assist and encourage the establishment of a local dealership for plug-in electric cars. .
- 8) [Idle Reduction Campaign](#) – The City should participate in the EPA’s National Idle Reduction Campaign and educate the public about the importance of engine idle-reduction practices.
- 9) [Increase Bicycle Use](#) – The City should collaborate with regional bicycling advocates in order to increase bicycle use as a mode of transportation.
- 10) [RideShare Program](#) – The City should work with the Ohio-Kentucky-Indiana Regional Council of Governments to promote RideShare programs for citizens and workers in Cincinnati.

<sup>1</sup> Davis and Hale, 2007. ([www.apta.com/research/info/online/document/climate-change.pdf](http://www.apta.com/research/info/online/document/climate-change.pdf))

Transportation Task Team Recommendations - Executive Summary (continued)

- 11) [Improved Community Fuel Efficiency](#) – The City should work with the Cincinnati USA Regional Chamber and business associations to initiate diverse fuel efficiency plans in the private sector. Additionally, the City should fund an outreach effort geared toward educating the general public about improving fuel efficiency and efficient driver behavior.
- 12) [Complete Streets](#) - The City should ensure adequate funding for the construction, maintenance and rehabilitation of “Complete Streets.”

LONG TERM - more details on recommendation click on corresponding link.

- 13) [Regional Light Rail Plan](#) – The City should support the development of a regional light rail system.
- 14) [Regional Bus Service Expansion](#)– The City should support a major expansion of regional bus service, similar to the regional component of the MetroMoves plan.
- 15) [The Ohio Hub Plan](#) – The City should support the efforts of the Ohio Rail Development Commission (ORDC) to establish rail passenger service between major regional cities.

All of these proposals will contribute to reducing carbon emissions. Some proposals require an on-going policy commitment, such as Cincinnati Fleet Fuel Efficiency and Complete Streets. Some proposals such as RideShare, Increase Bicycle Use and Green Locomotives could be implemented in the near-term; others such as continued work on the Ohio Hub Plan, and the MetroMoves type of expansion plan, are longer range endeavors.

## Energy Task Team Recommendations

### 1 Residential

- A. Calculable Greenhouse Gas (GHG) Emissions
- B. Community Outreach/ Education
- C. Policy

**1A: Calculable GHG Emissions:** The ideas below have been organized from most to least cost effective based on the amount of reduction as a ratio to cost (most bang for your buck). Many of these strategies require little capital output from the City but will require getting information out to the public through some means, such as mailings or publications. For more details on recommendation click on corresponding link.

1. [Encourage overall home energy efficiency measures, such as, CFLs, smart power strips, temperature modifications, etc.](#)
2. [Encourage programmable thermostats, set back temperatures during winter & raising temperatures during the summer.](#)
3. [Encourage running clothes washer with cold water only.](#)
4. [Encourage running dishwasher at low energy setting & let dishes air dry instead of using heating coil.](#)
5. [Encourage citizens to install insulating blankets on water heaters/ verify water heater is set at 120 degrees and not higher.](#)
6. [Encourage Energy Star for residential construction. To earn an Energy Star rating, a home must meet guidelines for energy efficiency set by the U.S. Environmental Protection Agency.](#) These homes are at least 15% more energy efficient than homes built to the [2004 International Residential Code \(IRC\)](#), and include additional energy-saving features that typically make them 20–30% more efficient than standard homes.
7. [Make free compact fluorescent light \(CFL\) bulbs available to low income citizens. Chicago's Smart Bulb Program has done this by partnering with the Northern Illinois Energy Project \(NIEP\) and Midwest Energy Efficiency Alliance.](#)
8. [Work with existing businesses and lending institutions to create a City administered Green Loan program to help pay for energy efficient construction or energy efficient renovation \(best practice recognized standard\).](#)
9. [Encourage renewable energies such as Solar Photovoltaic Electric.](#)
10. [Encourage renewable energies including solar thermal hot water collectors for homes.](#)

**1B: Community Outreach & Education:** These ideas have been determined by our task team to be a non calculable but critical piece of reducing emissions in our City. The strategies below are prioritized from most to least critical.

1. [Offer classes to the public in the new community learning centers at Cincinnati Public Schools. Increase education efforts in schools using current infrastructure such as Keep Cincinnati Beautiful or the Young Professionals Kitchen Cabinet's Health and Environment Committee.](#)
2. [The city should sponsor contractor training focused on offering a comprehensive approach to home improvement that provides comfort and both energy and cost savings for homeowners similar to Boulder.](#)

Energy Task Team Recommendations (continued)

3. [http://egov.cityofchicago.org/city/webportal/portalEntityHomeAction.do?BV\\_SessionID=@@ @1179468257.1200496514@@@&BV\\_EngineID=cccdadeddhfgdmdcefecelldffhdfhl.0&entityName=Chicago+Conservation+Corps&entityNameEnumValue=174](http://egov.cityofchicago.org/city/webportal/portalEntityHomeAction.do?BV_SessionID=@@ @1179468257.1200496514@@@&BV_EngineID=cccdadeddhfgdmdcefecelldffhdfhl.0&entityName=Chicago+Conservation+Corps&entityNameEnumValue=174) here to be called the Cincinnati Conservation Corps; Mission of this organization is to "recruit, train, and support a network of volunteers who work together to improve the quality of life in our neighborhoods through environmental service projects that protect our water, clean our air, restore our land & save energy."

**1C: Policy:** This category introduces the idea of creating regional strategies to reduce green house gas emissions that can be adopted by local governments but are not necessarily measurable. The strategies below are prioritized from most to least critical.

1. [Grants for low income residents specifically for energy efficiency similar to Cleveland's program.](#)
2. [Residential Best Practices– Energy self sufficiency, annual mayor's climate change best practices awards and ceremony for best return on investment.](#)
3. [Expand "LEED ordinance" to include a residential retrofit program. In 2007, Council passed an ordinance allowing for property tax exemptions for certain residential, commercial, and industrial properties.](#)
4. [Building efficiency disclosures as part of real estate transactions, much the way we put vehicle MPG ratings on new car window stickers. This would allow the market to appropriately value energy efficiency in real estate transactions, encouraging developers and sellers to invest in energy upgrades.](#)
5. [The city of Cincinnati should develop qualified advocacy/legal/lobbying capabilities to ensure strong advocacy of State and Federal policies.](#)

## **2 Commercial, including Government and Schools, and Industrial**

- A. Calculable Greenhouse Gas (GHG) Emissions
- B. Community Outreach/ Education
- C. Policy

**2A: Calculable GHG Emissions:** The ideas below have been organized from most to least cost effective based on the amount of reduction as a ratio to cost (most bang for your buck). A lot of these strategies require little capital output from the City but will require getting information out to the public through some means such as mailings or publications.

1. [Identify the Banks as a showcase for sustainable community development and hold a colloquium for architects and engineers to make the region home to zero energy buildings; encourage LEED \(Leadership in Energy and Environmental Design\).](#)
2. [School Boards of Education- mandate energy use reductions, i.e. turning out lights at the end of the day, turning off computers when not in use.](#)
3. [Expand Mayor Mark Mallory's Green Cincinnati program to be more aggressive with energy efficiency savings goals. In 2007 Mark Mallory set a 4% energy reduction in one year and 10% in 4 years for City buildings, excluding city utility departments.](#)
4. [Encourage roofs with high Solar Reflectance Indexes \(SRI\)/ white roofs/ vegetated roofs. Chicago offers grants of \\$5000-\\$6000 for cool roofs and vegetated roofs. A cool roof uses special materials to reflect the sun's energy instead of absorbing it and warming the building below.](#)
5. [Department of Transportation should install more energy efficient street lighting.](#)

Energy Task Team Recommendations (continued)

6. [Provide vouchers to City employees to ride Metro to work for free. The IRS downtown and in Covington have a program where they provide free bus vouchers to employees. Duke has a similar program in place.](#)
7. [Update building codes for commercial construction and mandate increased efficiency for lighting, insulation, & water use.](#)
8. [Renewable Energies \(Solar Thermal Minimum\).](#)
9. [Encourage the business sector \(Commercial and Industrial\) to implement energy efficiency measures for their buildings and facilities.](#)

**2B: Community Outreach & Education:** These ideas have been determined by our task team to be a non calculable but critical piece of reducing emissions in our City. The strategies below are prioritized from most to least critical.

1. [Upgrade City of Cincinnati's web site to make Environmental Initiatives more obvious. Use these as a marketing tool to attract/ retain green industry. State and Federal programs with links which are applicable to our citizens, should be readily available along with Cincinnati's accomplishments and goals for environmental change](#)
2. [Work with Duke to develop and install residential electric meters that conveniently display both \\$ to date as well as the current \\$/minute usage so that the occupants can have economically quantified cause and effect feedback to curtail consumption.](#)
3. [Encourage local schools to participate in fundraising programs similar to CFLs for Kids. <http://www.cflsforkids.com/frasqu.html> . CFLs for Kids is a fundraising program in which children sell CFL lights and other energy efficiency products.](#)
4. [The Green For All campaign, presently active in several U.S. cities, provides job training and related services to inmates and other disadvantaged people to prepare them for production employment in the new green economy. A similar workforce development program should be established in Cincinnati.](#)

**2C: Policy:** This category introduces the idea of creating regional strategies to reduce green house gas emissions that can be adopted by local governments but are not necessarily measurable. The strategies below are prioritized from most to least critical.

1. [Business Best Practices: Awards and ceremony, winning criteria limited to best ROI \(\\$, financial return on investment\) of a project.](#)
2. [Improve coordinating utility cuts and street rehabilitation \(new asphalt\). Where possible, transform asphalt medians to green medians.](#)
3. [Require all City painting to use non or low Volatile Organic Compound \(VOC\) paint whenever possible by City Ordinance.](#)
4. [Municipal Best Practices– Energy self sufficiency & annual mayor's climate change best municipal practices awards](#)
5. [Building Department:](#)
  - a. Maintain Cincinnati's Building Department and educate them on green building/ energy efficiency. Initiate "green permitting" program similar to Chicago to further capture the efficiency of sustainable building.
  - b. Initiate a program through the Building Department in which design professionals can be designated as "green building professionals", perhaps using an established program such as LEED for certification. Upon designation of "green building professional", they are added to a list on the city's website.

Energy Task Team Recommendations (continued)

6. [Have City cosponsor a model competition with AIA \(American Institute of Architects\) to increase publicity.](#)
7. [Greenlight Districts: In Grand Rapids and Milwaukee, brown fields have been marketed as Greenlight Districts, indicating a “zone where the City gives a ‘green light’ on use of Tax Incremental Financing and other economic development tools within the corridor to attract businesses, especially ‘green’ industries.](#)
8. [Investigate a Carbon Offset Commission whose mission would be to provide high quality local carbon offset products for local consumer's dollars that would otherwise fund projects elsewhere, similar to Chicago’s program.](#)
9. [Encourage Duke Energy to reduce the carbon intensity of its generation portfolio.](#)
10. [The City of Cincinnati should develop qualified advocacy/legal/lobbying capabilities to ensure strong advocacy of State and Federal policies.](#)

## Waste Task Team Recommendations

The mission of the Waste Task Team is to identify ways to reduce greenhouse gas emissions by implementing and expanding waste reduction and recycling programs. To accomplish this mission, the waste task team developed several ideas on how to enhance the City's current curbside recycling program to divert additional material from landfills, expand the City's environmentally preferable purchasing, encourage commercial and institutional recycling, and develop new programs targeted to reuse programs, electronics waste, and food waste composting.

The programs listed below are ranked in order of priority. The first six programs mentioned could be initiated with the next 2-3 years. The final two programs require more research and are considered long-term goals.

**Priorities** - For more details on recommendation click on corresponding link.

1. [Cart-based recycling program](#) - Using larger containers could conservatively yield a 25% increase in the amount of materials recycled. Residents recycle more material with carts because they have a greater capacity and are easier to use than traditional curbside bins. Through this recommendation, households eligible for curbside recycling service would receive a 64 gallon wheeled recycling cart, if needed.
2. [Environmentally Preferable Purchasing](#) - Environmentally Preferred Purchasing refers to the practice of procuring goods and services "...that have a lesser or reduced effect on human health and the environment when compared with competing products or services that serve the same purpose..."<sup>2</sup> As such, buying green offers the potential to reduce GHG emissions. Through this initiative, the City of Cincinnati would encourage green purchasing through all departments.
3. [Commercial Recycling](#) - Encourage local businesses to initiate paper recycling programs through programs such as an educational campaign (with the City leading by example) and providing technical assistance to implement business recycling programs.
4. [Reuse Network](#) - Create and/or publicize a Reuse Network that will increase public awareness and enable residents and businesses to decrease their landfill disposal. Through this initiative, the City would identify non-profit organizations that accept used materials such as clothing and furniture and promote these outlets to residents.
5. [Electronics Recycling](#) - Recycling electronic waste, such as computers and televisions, has a positive impact on greenhouse gas emissions. Many avenues exist to increase recycling of residential electronic waste in Cincinnati, including holding neighborhood collections and promoting the existing Hamilton County collection.
6. [Foodwaste Composting](#) - The overall strategy is to increase awareness of food waste reduction and home composting efforts and to facilitate and encourage the building of an effective infrastructure to handle food waste composting.

### Additional Research Required/Long Term Projects

7. [Pay-as-you-throw](#) - A Pay-as-You-Throw program, or PAYT, provides a direct economic incentive to residents to reduce their waste. Under PAYT, the City would charge households for their waste collection based on the amount of waste they throw away.

<sup>2</sup> USEPA website: <http://www.epa.gov/epp/pubs/about/about.htm>, accessed 1/24/08

Waste Task Team Recommendations (continued)

8. [RecycleBank](#) - RecycleBank uses a computerized cart system to provide financial incentives to individual households based on the amount they recycle. The amount recycled translates into RecycleBank reward points that residents use to shop at participating stores.



## Land Use Task Team Recommendations

Land use, and how space is organized and used in a city has a significant impact on how much greenhouse gas is emitted in an area. Communities that are densely built with housing, employment and shopping locations all in close proximity, where people have choices other than driving to get to where they way to go, emit much less greenhouse gas than places developed in a low-density way where uses are isolated and the private car is the only way to get around. The primary reason for the significant difference between these two kinds of areas is the increase in driving a person does in the low-density community v. the dense, mixed use one.

Dense urban forms were typical of Cincinnati's early neighborhoods, and most of the City developed before about 1940. Early development assumed people were walking or using public transit (the streetcar systems). Over time as development patterns became less dense and dependence on the private car grew development became lower density and separated uses more and more. Even our older neighborhoods lost density over time as people and businesses moved out of the core.

To create and re-create the kinds of communities that are dense, mixed-use and have lots of transportation choices will be a major undertaking. Significant changes in the way public and private investments are made will be necessary. This will require unprecedented cooperation between public and private partners, as well as deliberate input and participation from citizens as a new kind of partner in the development process. In order to truly make these changes real, both regulatory changes and incentives will be necessary. Form based zoning codes are being implemented in many communities to implement the kind of changes needed to create real land use change. Changes to transportation and infrastructure investment priorities will also be necessary.

**Short- term quantifiable priorities** – by priority with key recommendations:

For more details on recommendation click on corresponding link

### 1) **Green Construction Practices**

#### a) [Construction Industry Practices](#)

- i) Develop best GHG reduction practices for construction projects
- ii) Recycle high percentage of demolition & construction materials

#### b) [Land Use Control and Planning Techniques](#)

- i) Provide incentives for local sourced and manufactured materials
- ii) Implement LEED standards

### 2) **[Forest Carbon Sequestration](#)**

- a) Implement Parks Reforestation Plan for 20 city communities
- b) Develop tree preservation ordinance to protect trees from removal
- c) Implement Parks Parking Lot
- d) Plant trees throughout widened I-75 corridor

Land Use Task Team Recommendations (continued)3) Sustainable community Agriculture

- a) Expand community gardening program
- b) Develop comprehensive composting program

4) Implement Industrial Best Management Practices5) Environmental Literacy – Programs to improve environmental literacy of Cincinnati residents.**Long-term non-quantifiable priorities**6) **Incentive Based Mixed Use and Conservation Planning**

- a) Develop Incentives to Promote Mixed Use Development Patterns
- b) Improved Integration of Mass Transit – Create Incentives for clustered development to conserve greenspace and integrate mass transit
- c) Relax Minimum Parking Requirements

7) Create Regional Trail System

- a) Implement existing trail plans such as Ohio River and Mill Creek
- b) Develop trail linkages to Neighborhood Business Districts, parks, schools, rec centers, major employers, and the Central Business District using bike lanes, abandoned transportation corridors, utility rights of way, and available public property.
- c) Develop connections to existing and proposed public transportation systems.

8) Regional Land use Plan9) Redevelop Brownfields

- a) Return vacant, contaminated, or underused land to productive use
- b) Improve overall environmental quality and quality of life
- c) Provide developable property near the urban core.

## Advocacy Task Team Recommendation

The Climate Protection Advocacy Task Team was charged with developing an advocacy plan for recommendations that would come from the other four task teams. Advocacy is the most promising tool among those to reduce greenhouse gas (GHG) emissions. The specific methods of greenhouse gas emission reduction proposed by the other Task Teams will yield quantifiable results; however, only an advocacy plan of these ideas will make these reductions possible. Advocacy, in short, promotes not environmental change, but behavioral and organizational change. Advocacy of climate protection serves both as a mechanism to promote the changes proposed by each task team and as a tool in and of itself, i.e., a “change agent.”

The Advocacy Task Team produced several proposals to be included in the Cincinnati Climate Protection Policy. Below are those ranked in order of best Sustainability for GHG reduction: For more details on recommendation click on corresponding link.

### [HOLD CLIMATE SUMMIT](#)

1. This proposal is designed to bring together the significant environmental, social, and public policy resources in a unified setting to discuss the benefits and impediments to climate change proposals for Greater Cincinnati.

### [CREATE MULTI-LAYERED MARKETING PLAN/PLANS FOR GHG REDUCTIONS](#)

2. This proposal is designed to create a series of marketing campaigns to “sell” the specific proposals generated by each Task Team (Energy, Land Use, Transportation, and Waste Reduction).

### [DEVELOP PUBLIC EDUCATION PROGRAM](#)

3. This proposal is designed to provide additional support to the development of a public education program (as part of the marketing plan) because it plays an extremely important part in the behavioral change process.

## Food Related Issues

Simple food choices can have a significant impact on green house gas emissions. What we eat, where it is grown, how it is grown, and how it is packaged are all decisions that are important from a climate perspective. These decisions also have a big impact on human health, air and water quality, ecosystem diversity, and our national economy.

Food issues, especially the climate impacts of reducing meat consumption, were raised by several speakers at the public hearing on Cincinnati's draft Climate Protection Action Plan on February 25, 2008, and have been the focus of studies by the United Nations and others.

The significance of food issues was not recognized at the outset of Cincinnati's Climate Protection Planning Process. Food issues do not fit easily into the subject area of any of the five Task Teams which did the bulk of the work in developing this Climate Protection Action Plan. While some food issues have been researched and presented to the Steering Committee, others have not yet been examined.

It is the recommendation of this report: that a Food Task Team be formed, similar to the five recently concluded task teams; that the Food Task Team develop recommendations for GHG emission reduction measures related to food choices; and that those recommendations be brought to the Steering Committee for inclusion in a revision to Cincinnati's Climate Protection Action Plan.

Food related emission reduction measures include, but are not limited to:

- 1) [Reduced Meat Consumption](#) – Studies indicate that meat production is responsible for significantly more GHG emissions than electricity production, and significantly more GHG emissions than the whole transportation sector. Eating less meat is a simple and effective way to reduce GHG emissions.
- 2) Eating Local - Eating locally produced foods reduces the energy usage and GHG emissions needed to transport the food from its point of production to its point of consumption. It also results in fresher, healthier food, and supports the local economy.
- 3) No-Till Agriculture - One of the Earth's most significant methods for sequestering carbon is by building topsoil. Modern agricultural practices tend to deplete the top soil, releasing large quantities of previously sequestered carbon back into the atmosphere. Selecting foods that were produced using no-till methods and other topsoil building techniques can significantly reduce GHG emissions.
- 4) Reduced Packaging - The production of packaging materials is energy intensive, and adds to the size and weight of food products as they are shipped and stored. Some packaging is necessary for preservation and protection of food items, but significant GHG reductions are possible by selecting foods with minimal packaging.
- 5) Organic Foods – Agricultural chemicals contribute to the emission of GHGs. Selecting organically grown foods can reduce GHG emissions.

## Discussion of Recommended Actions

The 80+ recommended actions contained in the previous chapter have each been analyzed from a variety of perspectives. The results of those analyses are useful in understanding the recommendations and how to implement them.

**Readiness for Implementation** – This report contains 2 kinds of recommendations. Some of the recommended actions are fully researched and well understood, and the recommendation is for rapid implementation. For other items, it has been determined that the recommended action will reduce greenhouse gas emissions and generate other important benefits, but due to the complexity of the issue or the time and resource limitations of the planning process, more planning work must be done before a responsible decision maker could commit to implementation. In that case, the recommendation is for further study, followed by implementation if justified by the results of the additional study. The table on pages 20-23 identifies which items are recommended for implementation, and which items are recommended for further study.

**Quantifying Emission Reductions** – For many of the recommended actions in this report, GHG emission reductions have been quantified. These numbers are based in some cases on predicted adoption rates for various practices, on the experiences of other municipalities who have taken similar actions, or on the opinions of experts who have studied the issue under discussion. As with all projections, there can be no certainty that our actual experience will match our projections. The staff and Task Team members have provided their best estimates of most likely outcomes. We have not adopted aggressive estimates, which might exaggerate the benefits of proposed actions, nor conservative estimates, which might inappropriately discourage the adoption of beneficial recommendations. We have, to the extent possible, attempted to use mid-range estimates and most likely outcome projections in quantifying emission reductions. For each recommended action, emission reductions have been computed for the year 2012 (short term goal) and the year 2028 (long term goal). Reductions in emissions attributable to City Government's operations are included in the overall totals, but are also tallied separately to allow a separate evaluation of City Government's efforts. Emission Reductions associated with each recommended action are presented in the table on pages 20-23.

**Achieving Emission Reductions** - For many recommendations, the actual emissions reductions will depend on how effectively Cincinnati harvests the available opportunities. A December 2007 study by McKinsey & Company for The Conference Board looked at available and economically viable greenhouse gas emissions reductions on a national level. The report finds that low cost and negative cost opportunities are available to dramatically reduce GHG emissions. How much we actually reduce GHG emissions depends on how effectively we mobilize to harvest these opportunities.

The McKinsey report evaluated three "cases", and graphed GHG reductions associated with each of those 3 cases. The "low case" is based on incremental departures from current practice, and results in about a 15% reduction in GHG emissions by 2030. The "mid case" is based on concerted action across the economy, and results in about a 30% reduction in GHG emissions by 2030. The "high case" is based on an urgent national mobilization, and results in a 45% reduction in GHG emissions by 2030.

### Discussion of Recommended Actions (continued)

The lesson of the McKinsey report is that success or failure depends on how effectively we mobilize across all sectors of our community to harvest opportunities. This report recommends advocacy efforts, including an aggressive marketing effort to promote climate protection activities. This effort cannot succeed without adequate support and funding for the marketing effort.

**Quantifying Economic Costs/Benefits** – In evaluating the economic costs or benefits of each recommendation, lifecycle costs have been used to the extent practical. Many of the recommended actions involve an initial capital expenditure, followed by ongoing savings such as reduced energy costs. The value of the energy and other savings were deducted from the implementation costs and other costs to achieve a lifecycle cost. If the lifecycle economic benefits of an action exceed its costs, that is, if the idea more than pays for itself, the cost of the recommendation is recorded as zero. For such actions, a rough approximate of the action's financial payback period has been made. Only 2 of the 32 quantified recommendations in this report have a cost greater than 0. Recycling electronic wastes (Waste Task Team Recommendation #5) costs \$6 for each ton of CO<sub>2</sub> eliminated. Planting trees (Land Task Team Recommendation #2-A) costs \$39 for each ton of CO<sub>2</sub> eliminated. Both of these proposals are well below the \$50/ton level commonly used as the affordability ceiling. The economic cost per ton of CO<sub>2</sub> eliminated for each recommended action and the estimated payback period for the initial investment are shown in the table on pages 20-23.

**Non-Economic Costs/Benefits** – For each recommended action, the impacts on the City's overall sustainability and other priorities were examined. Examples of relevant priorities include public health, public safety, conserving resources, improving air quality, creating jobs, and enhancing the local economy. No objective scale exists for scoring such impacts, so a subjective scoring system was used. Each recommended action received one of the following scores:

- ++ Provides significant non-economic benefits
- + Provides some non-economic benefits
- 0 Non-economic benefits and harms are approximately equal
- Imposes some non-economic harms
- Imposes significant non-economic harms

The score assigned to each recommended action is shown in the table on pages 20-23.

**Business Opportunities** - Full implementation of all recommendations in this report will require the investment of several hundred million dollars. This investment should not be regarded as a cost. Since each recommendation produces resulting revenue or savings in excess of the investment, the investments should be regarded as increased economic activity and sound business opportunities.

## Implementation – How do we make sure it all happens?

**Background** - How can we make sure that the Climate Action Plan is implemented once it is completed? That is one of the most important questions being considered by the Climate Protection Steering Committee. As discussions of implementation took place, several subordinate questions arose:

- Who will spearhead the implementation process?
- What staff would be available for this work?
- What will the budget be?
- Who will be accountable for results, and how will they be held responsible?

Each of these questions is the focus of additional discussion.

**Leadership** – The Climate Protection Planning Process is currently being lead by the Climate Protection Steering Committee. The Steering Committee includes 18 leaders representing various constituencies, appointed by Mayor Mallory to serve while the City’s Climate Action Plan is being developed, which is scheduled for completion in April 2008. Two alternatives have been identified to provide leadership as Cincinnati implements its Climate Action Plan.

Option 1 – The Climate Protection Steering Committee could transition from a temporary group to a permanent group and lead implementation of the Climate Action Plan. If the Steering Committee becomes permanent, some review may be needed to see whether the current members are willing to continue serving, and to determine whether any additions or deletions to the current membership would be appropriate.

Option 2 – The City’s Environmental Advisory Council (EAC) could be designated to lead implementation of the Climate Action Plan. The EAC is a group of volunteers appointed by the City Manager to advise the City on environmental issues. The EAC has been in existence for more than 30 years. In preparation for this role, the EAC’s Standing Rules could be amended to assure adequate representation of all relevant constituencies on the EAC.

Recommendation: A permanent Climate Protection Steering Committee closely resembling the current Steering Committee should be created and charged with overseeing implementation of this Climate Protection Action Plan. The current Steering Committee has functioned very effectively in overseeing the planning process. The changes that would be needed in the EAC to make it well suited to climate implementation would make it less well suited to performing its original function, which is to advise the City on a broad range of environmental topics.

**Staffing** – Staffing for the Climate Protection Planning Process is being provided by the City’s Office of Environmental Quality (OEQ). OEQ has only one person, the Climate Protection Coordinator, currently assigned to do climate protection work. The Climate Protection Coordinator is a temporary position funded through April 2008. Recommendation: The Climate Protection Coordinator position should be made permanent, and a new advocacy/outreach/education position should be created to focus efforts on broadening participation in the climate protection effort.

**Budget** – Funding to implement elements of the Climate Action Plan are anticipated to be available from federal, state, county, city and private sources. All sources of funding should be utilized to the fullest possible extent. Recommendation: The City should establish funding in its regular budget sufficient to coordinate and manage climate protection efforts, and to meet the local match requirements which may be associated with varying funding sources. Recommendation: Funding which becomes available to the City

Implementation – How do we make sure it all happens? (continued)

through the federal Energy and Environment Block Grant program should be prioritized for use to implement the Climate Action Plan.

**Accountability** – The Climate Action Plan will include recommendations for a wide range of programs, projects and actions that reduce GHG emissions. For each of these recommendations, an entity will be identified willing to take responsibility for implementation and willing to champion the effort. The responsible entity may be a City Department, a civic organization, an individual, or whatever. The intention is to assign each recommendation to a group or individual that cares deeply about it and has the capacity to carry it out. Such decisions will be made on a case by case basis. A table showing implementation responsibilities appears on pages 40-42.

It is important for each entity with significant responsibilities for implementing the Climate Action Plan to be held accountable for the successful performance of those duties. This should start from the top, with City Council holding the Steering Committee accountable, and the Steering Committee holding staff accountable. Implementation of each component of the Climate Action Plan will be assigned to some person or organization, and some mechanism should be in place to assure that those responsibilities are fulfilled. Recommendation: The entity leading implementation of the Climate Action Plan should be required to prepare an annual progress report and annually appear before City Council to discuss progress reducing GHG emissions.

**Continuous Improvement** – The Climate Protection Steering Committee will oversee an ongoing assessment of the City's efforts in implementing this Climate Protection Action Plan. Any adjustments or modifications needed to enhance the City's GHG reduction efforts should be made as soon as possible. At least once each year, the Steering Committee shall provide a report to Council, evaluating the previous year's effort, and recommending any appropriate improvements or updates to the City's Climate Protection Action Plan.



### Climate Protection Plan Lead Implementation Responsibilities

<sup>1</sup> – Tentative

<sup>2</sup> – Confirmed

#### Transportation

No.	Recommendation	Lead
TTT1	Hybrid Bus	SORTA <sup>1</sup>
TTT2	Fuel Efficiency – City Fleet	City of Cincinnati-Fleet Services <sup>2</sup>
TTT3	Streetcar	City of Cincinnati / Department of Transportation and Engineering (DOTE) <sup>2</sup>
TTT4	Bus Expansion	SORTA <sup>1</sup>
TTT5	Shared Car	City of Cincinnati – Office of Environmental Quality (OEQ)
TTT6	Green Locomotive	OH Rail Develop Commission <sup>1</sup>
TTT7	Electric Car	City of Cincinnati – Office of Environmental Quality (OEQ) <sup>1</sup>
TTT8	Idle Reduction	City of Cincinnati-Fleet Services <sup>2</sup> , EAC, HCDOES
TTT9	Increased Bicycle Use – Bike/PAC	Bike/PAC <sup>2</sup>
TTT10	Ride Share	OKI <sup>2</sup>
TTT11	Community Fuel Efficiency	City of Cincinnati – Office of Environmental Quality (OEQ) <sup>1</sup>
TTT12	Complete Streets	City of Cincinnati-Dept of Transport. & Eng. (DOTE) <sup>2</sup>
TTT13	Regional Rail	SORTA <sup>1</sup>
TTT14	Regional Bus Expansion	SORTA <sup>1</sup>
TTT15	Ohio Hub	City of Cincinnati – Office of Environmental Quality (OEQ) <sup>1</sup>

#### Energy

No.	Recommendation	Lead
ETT1A-1	Residential Energy Efficiency	Environmental Advisory Council (EAC) <sup>1</sup>
ETT1A-2	Programmable Thermostats	EAC <sup>1</sup>
ETT1A-3	Cold Water Wash	EAC <sup>1</sup>
ETT1A-4	Air Dry Dish	EAC <sup>1</sup>
ETT1A-5	Water Heater Blanket	EAC <sup>1</sup>
ETT1A-6	Energy Star Construction	City of Cincinnati – Planning Department <sup>1</sup>
ETT1A-7	Free CFLs	Duke Energy <sup>1</sup>
ETT1A-8	Green Loan	Cincinnati Energy Alliance <sup>2</sup>
ETT1A-9	Photovoltaic Energy	GEO <sup>2</sup>
ETT1A-10	Solar Thermal	GEO <sup>2</sup>
ETT1B-1	Educational Outreach	EAC <sup>1</sup>
ETT1B-2	Contractor Training	US Green Building Council (USGBC) <sup>2</sup>
ETT1B-3	Conservation Corps	City of Cincinnati – Office of Environmental Quality (OEQ) <sup>2</sup>
ETT1C-1	Grant for Low Income	Community Development Dept <sup>2</sup>

ETT1C-2	Best Practices – Residential	EAC <sup>1</sup>
ETT1C-3	Amended LEED Tax Abatement	City of Cincinnati - Community Development Dept. <sup>2</sup>
ETT1C-4	Bldg Performance Disclosure	City of Cincinnati – Office of Environmental Quality (OEQ) <sup>1</sup>
ETT1C-5	State & Federal Policy Action	City of Cincinnati - OEQ <sup>2</sup>
ETT2A-1	Banks Project	USGBC <sup>2</sup>
ETT2A-2	Cincinnati Public Schools	Robert Knight <sup>2</sup> (GBBN/CPS)
ETT2A-3	Expand Green Cincinnati	City of Cincinnati – Office of Environmental Quality (OEQ) <sup>1</sup>
ETT2A-4	High SRI	City of Cincinnati – Office of Environmental Quality (OEQ) <sup>1</sup>
ETT2A-5	Street Lights	City of Cincinnati – DOTE <sup>2</sup>
ETT2A-6	Bus Passes	City of Cincinnati – Dept of Human Resources <sup>1</sup>
ETT2A-7	Comm Building Codes	City of Cincinnati – Planning Department <sup>1</sup>
ETT2A-8	Solar Thermal Comm.	GEO <sup>2</sup>
ETT2A-9	Energy Efficiency Comm/Indust Bldgs	Building Owners and Managers Association (BOMA) <sup>1</sup>
ETT2B-1	Upgrade Website	City of Cincinnati – Office of Environmental Quality (OEQ) <sup>2</sup>
ETT2B-2	Easy Read Meters	Duke Energy <sup>1</sup>
ETT2B-3	CFLs for Kids	Robert Knight <sup>2</sup> (GBBN/CPS)
ETT2B-4	Green for All	City of Cincinnati – Dept of Community Development <sup>1</sup>
ETT2C-1	Best Practice - Business	EAC <sup>1</sup>
ETT2C-2	Street Work Coordination	City of Cincinnati – DOTE <sup>2</sup>
ETT2C-3	No VOC Coatings	City of Cincinnati - Public Services <sup>2</sup> ; Department of Purchasing <sup>1</sup>
ETT2C-4	Best Practices - Govt	City of Cincinnati – Mayors Office <sup>1</sup>
ETT2C-5	Green Permitting	City of Cincinnati – Planning Department <sup>1</sup>
ETT2C-6	Design Awards	AIA-COTE <sup>2</sup>
ETT2C-7	Greenlight District	City of Cincinnati – Economic Develop Dept <sup>1</sup>
ETT2C-8	Carbon Offset Commission	City of Cincinnati – OEQ <sup>2</sup>
ETT2C-9	Electricity Generation	Duke Energy <sup>2</sup>
ETT2C-10	State & Federal Policy Action	City of Cincinnati - OEQ <sup>2</sup>

### Waste

WTT1	Recycle Carts	City of Cincinnati – Office of Environmental Quality (OEQ) <sup>2</sup>
WTT2	Buy Green	City of Cincinnati – Department of Purchasing <sup>1</sup>
WTT3	Commercial Recycling	BOMA <sup>1</sup>
WTT4	Reuse Network	Hamilton Co Department of Environmental Services – Waste Management (HCDOES) <sup>2</sup>
WTT5	E-Waste	Public Service <sup>1</sup>
WTT6	Foodwaste Compost	Source Reduction and Residential: Mayor’s Young Professional Kitchen Cabinet <sup>2</sup> Commercial/Industrial:

		HCDOES <sup>2</sup>
WTT7	PAYT	TBA
WTT8	Recyclebank	City of Cincinnati – Office of Environmental Quality (OEQ) <sup>2</sup>

**Land Use**

No.	Recommendation	Lead
LTT1-A	Green Construction	USGBC <sup>2</sup>
LTT1-B	Green Development Regulations	City of Cincinnati – Dept. of Planning <sup>1</sup>
LTT2-A	Forest Carbon Sequestration	City of Cincinnati – Park Board <sup>2</sup>
LTT3	Community Agriculture	Civic Garden Center <sup>2</sup>
LTT4	Industrial BMPs	Cincinnati USA Regional Chamber <sup>1</sup>
LTT5	Environmental Literacy	Growing green and Healthy Schools Initiative - Jeannie Nightingale <sup>2</sup>
LTT6-A	Mixed Use Development	City of Cincinnati – Dept. of Planning <sup>1</sup>
LTT6-B	Improved Mass Transit Integrate	City of Cincinnati – Dept. of Planning; SORTA <sup>1</sup>
LTT6-C	Reduced Parking	City of Cincinnati – Dept. of Planning <sup>1</sup>
LTT7	Regional Trails	City of Cincinnati – Park Board <sup>1</sup>
LTT8	Land Use Plan	City of Cincinnati – Dept. of Planning <sup>1</sup>
LTT9	Brownfields	City of Cincinnati – Strategic Program for Urban Redevelopment (SPUR) Team <sup>2</sup>

**Advocacy**

No.	Recommendation	Lead
ATT1	Hold Climate Summit	City of Cincinnati – OEQ <sup>1</sup>
ATT2	Create Multi-layered Marketing Plan	City of Cincinnati – OEQ <sup>1</sup>
ATT3	Develop Public Education Program	City of Cincinnati – OEQ <sup>1</sup>

**Food Consumption**

No.	Recommendation	Lead
F1	Reduced Meat Consumption	TBD

## **Appendix I**

# **Greenhouse Gas Emissions Inventory**

## **Data Sources**

## Greenhouse Gas Emissions Inventory Data Sources – revised 3/6/08

### Community Level

#### ***Energy***

*2006 and 2005 Electric and Natural Gas for Residential, Commercial, Industrial* – Duke Energy supplied this data.

*Residential Heating Oil and Propane Consumption* - used ICLEI's recommended method to quantify household use based on 2006 state-level consumption data and the percentage of households in the City/County that use these fuels based on Census data. The gallons consumed came from state-level data maintained by the Department of Energy, Energy Information Administration, State Energy Data System, Energy Consumption by Sector, Residential.

*Industrial Coal Consumption* - Based on 2006 Industry Reports of Actual Consumption, Hamilton County Department of Environmental Services.

*Industrial Heating Oil and Propane Consumption* - Industrial Sector assumes 5% of industrial establishments utilize fuel oil/kerosene and 13% utilize LPG, based on US National Averages from the Energy Information Administration (EIA), 2002 Manufacturing Energy Consumption Survey, rev. 3/2005. Per EIA data for Ohio, approximately 2% total energy consumption (in trillion Btu) consists of LPG, 4% consists of fuel oil/kerosene. Used ICLEI's recommended method to quantify industrial use of these fuels based on state-level consumption data and the percentage of establishments that use these fuels. State-level 2006 consumption data for heating oil and propane maintained by the Department of Energy, Energy Information Administration, State Energy Data System, Energy Consumption by Sector, Industrial. The total number of industrial establishments in the City/County was obtained from the Greater Cincinnati Chamber USA Partnership 2006 GISPlanning Demographic Report, 2006.

#### ***Waste***

*Landfilled Waste for Hamilton County* - Residential and commercial landfill tonnages originated from OEPA's annual reports to the Hamilton County Solid Waste Management District. City contribution portion was determined based on a pounds waste per person per year in the County applied to the City population data.

***Compost – Recycling information compiled from OEPA-approved Hamilton County Solid Waste Management District annual reports for 2006.***

*Percentages by Type of Waste* - 2003 Ohio Department of Natural Resources Waste Composition Study. Note that ICLEI does not have a waste category for: plastics, glass, diapers, or metals. These materials are combined under 'other'. ODNR's waste composition study only has a category for textiles, not wood or furniture.

#### ***Transportation***

*Vehicle Miles Traveled (VMT)* – 2005 VMT information provided by OKI for transit buses and all other. OKI provided the following assumptions - 48% of Hamilton County's non-bus VMT occurs in Cincinnati and 95% of Hamilton County's transit bus VMT occurs within Cincinnati. VMT increases 1% per year annual rate. Transit bus VMT remains constant.

Greenhouse Gas Emissions Inventory Data Sources – revised 3/6/08 (continued)Government Level - Cincinnati***Buildings***

*2006 and 2005 Electric and Natural Gas* - Duke Energy supplied this data for each facility. The Water and Sewage numbers were deleted from this section in the model and included only in the Water/Sewage section.

***Vehicle Fleet***

*Fuel Purchased* – Joel Koopman/John Ridder in Fleet Services supplied the total fuel purchased for 2006 for the City of Cincinnati and other municipalities by type of fuel. Carolyn Fehr, Accounts and Audits, provided the 2006 City government vehicle/equipment list including MSD, which OEQ classified into the ICLEI type categories of Heavy Truck, Light Truck or Passenger Vehicle.

***Street Lights/Traffic Lights***

*Street Lights/Traffic Lights* - Steve Bailey, Traffic Engineer in the Department of Transportation Engineering, provided estimated 2007 electric and gas consumption figures and growth rates.

***Water/Sewage***

*Water* - Paul Kraus of Water Works provided the Duke metered electric and the emergency generator energy consumption data for 2006, 05 and 00.

*Sewage* - Dave Castellini of Metropolitan Sewer District (MSD) provided the natural gas consumption data for 2006, 05 and 00 and a broad estimate for average electric usage.

***Waste***

*Waste* - Rumpke provide the estimated waste collected from the locations specified in the purchase contract. They also estimated the waste delivered directly to them from City departments, like Parks.

Indicators

*Population* - The 2006 population number for the City of Cincinnati is currently a disputed number. For our purposes the Mayor's Office advised the use of the 2005 US Census Bureau approved figure of 331,310.

Data gathered and calculated by: Hamilton County Environmental Services and City of Cincinnati and Office of Environmental Quality.

## **Appendix II**

### **Transportation Task Team Recommendations**

## Climate Protection Transportation Task Team Hybrid Transit Busses

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 1

All Metro buses purchased in the future should be diesel-electric hybrids rather than standard diesel vehicles.

#### Estimated Annual GHG Reduction

**1,637 tons by 2009**

**Summary of specific issues** –Metro currently operates 390 40 ft. diesel buses. Replacing these buses with diesel-electric hybrids will save fuel and significantly reduce CO<sup>2</sup> emissions.

**Strategy/action plan** – Metro will be purchasing 50 vehicles this year as part of their scheduled fleet replacement. It is the recommendation of the Cincinnati Climate Protection Transportation Task Team that Metro purchase hybrid vehicles, as opposed to standard diesel vehicles.

**Estimated greenhouse gas reduction to be achieved** - Diesel-electric buses are estimated to use approximately 1/3 less diesel fuel than standard vehicles. Based on Metro's 2007 fuel usage this savings would equate to 2,950 gallons of diesel per vehicle. According to EPA estimates, each gallon of diesel burned produces 22.2 pounds of carbon. Therefore, each bus would produce 65,490 less pounds of carbon (32.745 tons) per year, for a total for all 50 buses of 1,637.25 tons saved by 2009. Based on the 12 year life cycle for buses, this means that each bus would produce 392.94 less tons of carbon over its lifetime than a standard diesel bus. With the purchase of 50 vehicles this equates to 19,647 tons of carbon saved over the effective life of the hybrid vehicles. If Metro were to continue to replace the remaining 340 vehicles in its fleet (for a total of 390) with hybrid vehicles over the next 11 years, the result would be a total annual savings of 12,770.55 tons of CO<sub>2</sub> over 2008 emissions (beginning in 2020).

#### **Implementation responsibilities/assignments –**

- Metro
- City of Cincinnati
- Other funding partners

Initial cost - The incremental cost to upgrade the purchase of 50 standard 40 ft. diesel buses to hybrid-electric vehicles at \$120,000 per bus is \$6,000,000.

Source of Capital – Federal funds may be available to pay up to 90% of the incremental cost of hybrid transit busses. A local funding source for the remaining portion of the cost, or if federal funds are not available, has not been identified.

Life Cycle/Payback Period -Initial costs would be offset by an expected 30% reduction in gas consumption per vehicle (actual savings dependent on gas prices). At \$3.50/gallon, fuel savings would be \$10,325 per year, per bus. Simple payback on the increased purchase price would be 11.6 years.

#### **Multiple benefits anticipated (in addition to greenhouse gas reductions) –**

- Quieter operation
- Smoother ride
- Reduced gas consumption



Climate Protection Transportation Task Team – Hybrid Transit Busses (continued)

- Awareness in the community of green energy/technology

**Timeline for implementation** – Metro is anticipating the purchase of 50 vehicles in 2008. Based on available funds this project could be completed in 2008. With a federal life cycle of 12 years, the remaining buses could be replaced by 2020.

## Climate Protection Transportation Task Team Cincinnati Fleet Fuel Efficiency

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 2

The City of Cincinnati should commit to increasing the number of alternatively fueled vehicles in its fleet as outlined in a "Green Fleet" action plan.

#### Estimated Annual GHG Reduction

**803 tons/year by 2013**

**Summary of specific issues** – Operation of motor vehicles adds to local air quality problems and results in greenhouse gas emissions. The impact of ground-level ozone, particulate matter pollution and greenhouse gas affects breathing air, food, water resources, biodiversity and the ecosystem. In 2007, the Greater Cincinnati region was under a smog alert for high pollution levels for a total of 27 days - the highest in the past 12 years.

Americans represent five percent of the world's population but contribute 45 percent of the world's emission of carbon dioxide, the main pollutant that causes global warming. Carbon dioxide emissions from vehicles are disproportionately high in the United States for two primary reasons: U.S. drivers average 11,000 miles per year, 29 percent above the global average, and U.S. autos consume more fuel, emitting 15 percent more carbon dioxide per mile than the average vehicle in the rest of the world.<sup>3</sup>

Despite the substantial progress in reducing emissions from mobile sources nationwide, the congressionally mandated report from The National Academies' National Research Council found that more needs to be done to attain federal air-quality standards in many parts of the country relative to these sources (which include cars and light and heavy duty trucks; diesel-powered cranes, bulldozers, and tractors; and equipment such as lawnmowers that run on small gasoline engines). In December 2007, the United States saw the first increase in domestic auto fuel efficiency standards in more than three decades. The energy bill requires a 40 percent increase in vehicle fuel economy standards, raising the average fleet standard to 35 miles a gallon by 2020. The current standards are 27.5 mpg for cars and 22.2 mpg for SUVs and trucks. The gradual implementation of the tougher standards begins with the 2011 model year.

**Strategy/action plan** – The City of Cincinnati has a significant role to play in improving the efficiency of its fleet and reducing emissions from fleet operations. Whenever possible, pickup trucks, offroad equipment, vans, wagons, police cruisers and administrative sedans should be replaced with hybrid, ethanol, or biodiesel powered vehicles. In order to accomplish this, the City needs to conduct a thorough review of its entire fleet, develop an action plan with implementation timeline, and enact the plan as policy. The city should conduct a review of its on-road and off-road vehicle operation and maintenance procedures to reduce vehicle emissions. With the inventory completed, the city can proceed with the development of a "Green Fleet" action plan for the City of Cincinnati to 1) operate cleaner vehicles and 2) operate vehicles in a more efficient manner. Strategies to be considered in the plan include:

- Hybrid vehicle purchase
- Alternative fuel use

---

<sup>3</sup> Environmental Defense, 2007.

Climate Protection Transportation Task Team – Hybrid Transit Busses (continued)

- Diesel truck retrofits
- Selection of smaller, more efficient vehicles when practical
- Driver behavior education, including the City's idling policy

The City of Cincinnati Fleet Services Division has been testing and evaluating alternatively fueled equipment since 1993. In 1997 the City chose Ethanol based fuel (E85) as the City's fuel of choice, and built the first E85 refueling station in the City of Cincinnati.

By 2004 the City fleet contained 135 ethanol powered administrative vehicles (37% of the fleet) and one Toyota Prius.<sup>4</sup> By 2007 the City fleet contained 277 ethanol powered administrative vehicles and one Toyota Prius.<sup>5</sup>

After monitoring the fuel economy and maintenance costs of the Toyota Prius, it was determined that the Prius was more cost effective during its life cycle than the ethanol powered vehicles. At this time Fleet Services is continuing to use the ethanol powered vehicles and will investigate suitable hybrid replacement vehicles as their budget allows.

The Transportation Task Team recognizes that the City has already made great strides in utilizing alternative fuels and hybrid vehicles. The "Green Fleet" action plan should build on this momentum by setting a timeframe for replacing remaining ethanol fueled vehicles with hybrids, and replacing gasoline powered vehicles with flexible fueled vehicles. For example, the average useful life of an ethanol fueled vehicle is six years; therefore, the entire administrative fleet could be replaced with hybrid vehicles by the year 2013, for a yearly GHG savings of 803 tons of CO<sub>2</sub> versus 2007 emissions.

**Implementation responsibilities/assignments –**

- City of Cincinnati Fleet Services

**Cost to implement/net savings from implementation** – Improving the energy efficiency of the City's fleet will result in GHG emissions reduction and monetary savings.

---

<sup>4</sup> "Hybrid Vehicle," City of Cincinnati Interdepartment Correspondence, 17 March 2004.

<sup>5</sup> "Fleet Management Review- Hybrid Response," City of Cincinnati Interdepartment Correspondence, 23 July 2007.

Climate Protection Transportation Task Team - Cincinnati Fleet Fuel Efficiency (continued)

	<b>Stratus</b>	<b>Prius</b>
Capital Cost	\$12,466	\$21,136
Maintenance per mile	\$.02	\$.02
Fuel cost per mile	\$.08	\$.05
Residual value	\$7,450	\$19,200
Total cost to operate for 6 years/67,000 miles	\$11,716	\$6,626
Annual CO2 emissions	6.9 tons	4 tons

Source: City of Cincinnati, 2007; Fueleconomy.gov, 2008.

**By 2013, 2.9 tons x 277 vehicles = 803 tons**

Initial Cost – Based on the above figures, the incremental cost of buying 277 hybrid vehicles would be \$2.4 million. These purchases would be spread out over 6 years, requiring \$400,000 per year.

Source of Capital – Using a lease/purchase agreement, most of the increased cost of the hybrid vehicle can be postponed until the savings from use of the vehicle are available.

Life Cycle Cost/Payback Period – The incremental cost of purchasing a hybrid vehicle is more than recaptured over the life of the vehicle. Because a significant portion of the savings comes as enhanced resale value, the break even point does not occur until the 6<sup>th</sup> year, when the vehicle is sold.

**Multiple benefits anticipated (in addition to greenhouse gas reductions) –**

- Reduced incidence of respiratory disease and flare ups
- Noise reduction with use of hybrid vehicles

**Timeline for implementation** – Conduct inventory and develop plan within six months. Hybrid vehicle replacement of administrative vehicles could occur in six years following the inventory.

## Climate Protection Transportation Task Team Implement the Cincinnati Streetcar

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 3

The City should construct the proposed Cincinnati Streetcar system.

**Estimated Annual GHG Reduction**      **4,300 net tons of CO2 per year by 2012; 28,068 by 2028**

**Summary of specific issues** - Local transportation is a large and growing generator of greenhouse gases, much of it from personal cars and light trucks. Rail transit is a strategy to enable people to save money, avoid congested highways and improve communities by providing car-competitive public transportation that stimulates urban growth in the form of dense, walkable neighborhoods. The availability of frequent, reliable public transportation may reduce the use of personal vehicles below expected levels as people begin to concentrate their activities in their own neighborhoods.

Cincinnati City Council is currently considering construction of a streetcar network. The Cincinnati Streetcar network would improve connectivity between neighborhoods and major employment, commercial, and recreational centers, as well as providing a catalyst for economic development.

**Strategy/action plan** - The Cincinnati Streetcar has broad political, business and civic support that may result in favorable action by Cincinnati City Council to undertake the project. No management infrastructure for owning, building and operating the Cincinnati Streetcar has been established, but city administrators have well-developed ideas on how these things should be done. The sponsor must undertake a concerted outreach effort in the neighborhoods served by the Cincinnati Streetcar to ensure that supportive land-use, transportation and economic development policies exist to maximize the benefits of the project.

**Estimated greenhouse gas reduction to be achieved** - An August, 2007 document titled “Economic Worthiness Study of Cincinnati Streetcar” by HDR Decision Economics provides reliable estimates of ridership and ridership growth. HDR also explicitly calculated the reduction in Vehicle Miles Travelled (VMT) over the thirty-year life of the streetcar, a total of 128,000,000 VMT.

According to the American Public Transit Association, “an average private vehicle emission rate is about 1.0 pound of CO2 per mile,” so every 2,000 VMT reduces CO2 by one ton. This suggests that the 3.9-mile Phase 1A of the Cincinnati Streetcar would reduce CO2 by 64,000 tons over thirty years in the relatively small area it serves, or 2,133 tons of CO2 per year. Extrapolating this value to Phase 1B (4.0 miles) saves an additional 2,188 tons of CO2. The grand total of CO2 reductions due to persons travelling on the Cincinnati Streetcar in Downtown, Over-the-Rhine and Uptown is 4,321 tons of CO2 per year.

In addition, dense settlement patterns reduce greenhouse gases because housing units are generally smaller, more energy-efficient, and have reduced thermal losses because of attached construction compared to older, single-family homes. Using ICLEI’s personal CO2 emission calculator and adjusting for likely behaviors of individuals living in Downtown and Uptown neighborhoods, the annual CO2 savings may range from 2.7 to 5.5 tons of CO2 per person per year. Five tons of CO2 per person per year could be used as an average for dense, walkable city neighborhoods.

The City of Cincinnati’s Streetcar Study assumes that the investment will result in 2,290 additional Downtown and OTR units over and above what is now planned. These would probably be smaller

Climate Protection Transportation Task Team – Implement the Cincinnati Streetcars (continued)

households than the 2.15 persons per household average for Cincinnati, say 1.50 persons per household. This suggests that Cincinnati may gain 3,435 new Downtown/OTR residents on account of the streetcar investment. Assuming that each new resident produces 5 fewer tons of CO<sub>2</sub> per year, Phase 1A of the streetcar project may result in the reduction of 17,175 tons of CO<sub>2</sub> due to the denser settlement patterns that result.

Greenhouse gas reductions for dense settlement patterns in Uptown are more difficult because new streetcar-driven household formations have not been explicitly estimated for Uptown. However, we can justifiably extrapolate from the City of Cincinnati's Streetcar Study which estimated that there would be 587 new households formed for each mile of the 3.9 track-miles of the project. Assuming that settlement patterns in Uptown are only half as dense as those in Downtown and Over-the-Rhine, we might expect to see something like 294 new households formed along each of the 4.0 track-miles of the Uptown segment, or a total of 1,176 new households resulting from the Uptown streetcar investment. Assuming that each of these households is similarly occupied by 1.5 persons, the streetcar investment may result in 1,764 new Uptown residents. Assuming similar housing construction types and personal travel patterns, these new residents should similarly be generating 5 tons less CO<sub>2</sub> per year, for a total savings of 8,820 tons of CO<sub>2</sub> per year.

Combining the totals from Downtown, Over-the-Rhine and Uptown, it's reasonable to assume that Cincinnati may see an annual reduction of 25,995 tons of CO<sub>2</sub> when the Cincinnati Streetcar is built-out through these neighborhoods.

Of course, electricity is needed to operate the Cincinnati Streetcar, and its generation will produce greenhouse gases. A comparable project will soon commence in Portland, Oregon – a 3.3 track-mile extension of the Portland Streetcar across the Willamette River that is projected to operate with similar equipment and service frequencies to what is planned for Cincinnati. The E.D. Hovee and Company estimated that this extension would use 988,620 kWh of electricity per year, or 299,581 kWh per track-mile. Thus, the 7.9 track-mile Cincinnati system could be expected to use 2,366,696 kWh of electricity per year. Duke Energy estimates that 1.9 pounds of CO<sub>2</sub> are generated for every kWh of power produced. Using this coefficient, one can assume that the operation of the Cincinnati Streetcar will produce 4,496,723 pounds, or 2,248 tons, of CO<sub>2</sub> per year.

In summary, the Cincinnati Streetcar's Downtown to Uptown segment will save 4,321 tons of CO<sub>2</sub> by reducing Vehicle Miles Traveled, but its operation will produce 2,248 tons of CO<sub>2</sub> per year – a net savings of 2,073 tons of CO<sub>2</sub> per year. However, the major benefits occur on account of dense settlement patterns and lifestyle changes that result in additional savings of 25,995 tons of CO<sub>2</sub> per year when the Cincinnati Streetcar is fully extended from Downtown through Over-the-Rhine to Uptown (for a net total savings of 28,068 tons of CO<sub>2</sub>/year). As the Cincinnati Streetcar is extended to other neighborhoods, the system will achieve “network effects” whereby each subsequent link increases the utility of the previous links because more destinations can then be accessed. Thus, it's reasonable to conclude that VMT and greenhouse gas reductions will be achieved at an increasing rate as the Cincinnati Streetcar is extended to more neighborhoods.

Climate Protection Transportation Task Team – Implement the Cincinnati Streetcars (continued)

Reductions due to persons travelling on the Cincinnati Streetcar in Downtown, Over-the-Rhine and Uptown versus in cars.	4,321 tons of CO2 per year
Reductions due to denser settlement patterns in 1A	17,175 tons of CO2 per year
Reductions due to denser settlement patterns in 1B	8,820 tons of CO2 per year
<b>CO2 REDUCTIONS</b>	<b>30,316 tons of CO2 per year</b>
CO2 generated as a result of streetcar operation	2,248 tons of CO2 per year
<b>NET TOTAL CO2 REDUCTION</b>	<b>28,068 tons of CO2 per year</b>

**Implementation responsibilities/assignments** - The Cincinnati Streetcar is a project of the City of Cincinnati and is being planned by the City's Department of Transportation and Engineering.

**Cost to implement/net savings from implementation** - The Downtown to Over-the-Rhine phase of the Cincinnati Streetcar is estimated to cost \$102 million, adjusted to year-of-expenditure dollars, and the Uptown extension is approximately \$80 million – a total capital cost of \$182 million. The median expected annual cost of operating the first phase of the Cincinnati Streetcar is \$2.2 million per year. The calculated mean expected value for total life cycle costs of operating the Cincinnati Streetcar through 2042, including the cost of disruption during construction, was estimated to be \$40.1 million. Extrapolating from this estimate, the cost for operating the Cincinnati Streetcar on a 7.9 track-mile route connecting Downtown, Over-the-Rhine and Uptown yields a total life cycle cost of \$81.22 million through Year 2042.

**Multiple benefits anticipated in addition to greenhouse gas reductions** - No electrically powered rail system that has opened since the end of World War II has ever gone out of business, so this appears to be a reasonably safe investment. HDR/HLB Decision Economics concluded that the median Present Value of the benefits of building and operating the Cincinnati Streetcar exceeds the Present Value of its costs by a ratio of 2.70 to 1.00; and further, that there was better than a 95% chance that the total benefits would exceed the total costs. HDR estimated that the Present Value of the aggregate increases in existing properties and the construction of new properties attributable to the streetcar investment would be \$379 million over 30 years. HDR estimated total mobility benefits and travel cost to be in excess of \$51 million over 30 years.

Extending car-competitive transit to Cincinnati's older neighborhoods may help to repopulate them by unwinding the prevailing model of separation of work and residence. As an urban circulator, the Cincinnati Streetcar will promote pedestrian mobility and community strategies that support neighborhood economic development, healthy life styles, and the establishment of an active street life to reduce crime. Because rail transportation tends to attract persons of all incomes, races and ages, the Cincinnati Streetcar may foster integration of Cincinnati's neighborhoods.

Since investment in the Streetcar is expected to breakeven, the CO2 reductions essentially are an additional benefit achieved at no cost.

**Timeline for implementation** - If City Council approves the Streetcar proposal, design and engineering would commence right away, and construction would begin in 2009 and would be completed by 2012.



## Climate Protection Transportation Task Team Expansion of Metro bus service (City Portion)

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 4

The City should support a significant expansion of Metro bus service within the City of Cincinnati

#### Estimated Annual GHG Reduction

#### Not Immediately Quantifiable

**Summary of Specific issues** – Metro provides a dense bus route network within the City of Cincinnati. However, the system consists entirely of fixed routes operated with standard-size, 40-ft. buses and almost entirely of routes that are radial in design, focusing on downtown Cincinnati as their start-end point. Within the city, there are only two crosstown routes that provide east-west service between neighborhoods without having to travel via downtown and a transfer. There is only one shuttle route (which connects riverfront parking lots with the CBD core on weekdays only).

The City should support a significant expansion of Metro bus service within the City of Cincinnati. While the exact nature of that expansion has not yet been determined, the Metro Moves plan provides a good example of what such an expansion might look like. The MetroMoves plan included three crosstown routes and one neighborhood shuttle route that would serve mainly city neighborhoods and provide frequent, seven-day-a-week service in major east-west travel demand corridors in the city. These routes were: Western Hills - Northside- Bond Hill- Kenwood Crosstown; Western Hills – Oakley via MLK & Uptown Crosstown; Lower Price Hill – Walnut Hills via Liberty Crosstown; and Uptown Neighborhood Shuttle.

**Strategy/action plan-** A coalition should be formed to plan and promote a major expansion of bus service within Cincinnati. The MetroMoves plan, developed by the Southwest Ohio Regional Transit Authority (SORTA) was based on a high level of trip-making and demand analysis in addition to a major public involvement process. The plan, which included a regional light rail system, was subject to a ½ cent sales tax in Hamilton County that was defeated at the polls. Support for the levy was strongest within city precincts. MetroMoves could be used as a starting point for planning to enhance bus service.

**Estimated greenhouse gas emissions to be achieved-** The 2002 MetroMoves plan identified the annual miles of new service operated and the estimated annual passenger trips generated. It is estimated that 5,144,050 annual vehicle miles traveled (VMT) would be saved, significantly off-setting the VMT added by additional buses on the street. The new buses are assumed to be biodiesel-electric hybrids.

Carbon emissions saved: 4,320,111 lbs./year

Estimate based on:

- 100% diversion of trips from car
- 6 mile avg. car trip length
- 5,144,050 VMT saved
- 23.1 miles/gallon average fuel economy
- 1 gallon = 19.4 lbs. carbon emissions

Carbon emissions produced: Not Immediately Quantifiable

Estimated based on:

- 4 miles/gallon average diesel bus fuel economy
- 45% improvement in fuel economy by using hybrid biodiesel buses



Climate Protection Transportation Task Team – Expansion of Metro bus service (City Portion)  
(continued)

- unknown number of bus miles travelled

**Implementation responsibilities/assignments-**

- SORTA/Metro

**Cost to implement/net savings from implementation-** For an expansion of bus service comparable in scope to the City portion of the MetroMoves bus expansion: The capital cost of 24 buses needed to operate this service package is \$12,000,000. Federal funds can be applied at 80% dependent on congressional sponsorship and support. The annual incremental operating cost is estimated at \$8.3 million (2008\$), which could be partially off-set by fares (covering 20% of operating costs), resulting in a net annual incremental operating cost of \$6.6 million. Off-setting costs resulting from savings derived by personal auto trips avoided (VMT savings) would be \$2,597,745/year.

**Multiple benefits anticipated (in addition to greenhouse gas reductions) –**

- New transit service will open up opportunities for more city residents to access jobs and economic opportunities that are not currently possible to efficiently reach, enhancing the tax base and reducing dependency on social services
- Reduced consumption of petroleum
- Streets will experience less wear and tear by reducing traffic
- New hybrid buses are very quiet and can reduce ambient noise levels
- Improved pedestrian environment will be encouraged

## Climate Protection Transportation Task Team Shared Car Service

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 5

The City should assess the feasibility of attracting a “shared car service” to Cincinnati.

**Estimated Annual GHG Reduction** **1000 tons/year initially; 5,000 tons/year by 2012**

**Summary of specific issues** – Car sharing is a relatively new concept within North America, having originated in major urban markets in Europe. Car sharing is essentially a short term car rental service that allows an individual without access to an automobile the means to automobile travel on short term notice. There are differing operational models for car sharing programs with both non-profit and for profit operations. All car sharing programs have the following characteristics:

- An operator (either public, non-profit or for profit) who enrolls an organized group of participants (members);
- A fleet of vehicles (most often fuel efficient or hybrid vehicles) that are owned, maintained, and insured by the operator;
- The operator positions the vehicles in a decentralized network of parking locations close to homes, workplaces and/or transit stations which are generally coordinated with the local municipality;
- Vehicles can be reserved in advance (typically via an online reservation system) that works in “real time”;
- Rentals of the vehicle fleet are for short time periods (increments of one hour or less) and do not typically exceed one day, as differentiated by traditional automobile rental agencies which rent their vehicles on a daily basis;
- Vehicles are self-accessing via a magnetic “smart” card issued to members by the operator. Entry and operation of the vehicles is controlled by a wireless communications network that allows the operator to restrict vehicle access and control by vehicle, member and time of day.

**Strategy/action plan** – Implementation of a comprehensive car sharing program within the central business district and/or the Uptown area surrounding the University of Cincinnati could serve to foster ongoing efforts to create urban residential housing. There are currently no car sharing programs in the region. There are startup programs in the Cleveland area (City Wheels) and at Ohio State University in Columbus, Ohio (Zip Cars). As of 2007, there were over 20 major urban centers as well as over 60 collegian campuses with car sharing programs. Operators are both non-profit organizations with varying levels of municipal or governmental funding and assistance, as well as commercial operators that more or less operate without any public funding or contractual commitments. A review of car sharing markets and operators in the United States is the subject of TCRP Report 108 “*Car Sharing Where and How it Succeeds*” published by the Transportation Research Board in 2005.

**Estimated greenhouse gas reduction to be achieved** – Car sharing allows multiple residents to utilize a conveniently located automobile when needed while reducing or eliminating the need and costs associated with owning, insuring, fueling and maintaining an automobile. Fixed costs of automobile ownership are significantly reduced or eliminated and replaced in exchange for somewhat higher costs on a per trip or per hour basis. This shift in transportation economics puts a premium on reducing the numbers and duration of automobile trips. Research has indicated that car sharing programs result in a reduction of private automobile ownership as well as a reduction in vehicle miles traveled. This reduction in automobile use in turn results in less vehicular green house gas emissions.

Climate Protection Transportation Task Team – Shared Car Service (continued)

Most major car sharing programs indicate that each fleet vehicle is utilized such that it consolidates trips that would have required the use of 15-20 automobiles if the service were not available. Specific and independently verifiable estimates of a reduction in vehicle miles and hours traveled by market or collectively have not been found; however, most operators state that 10% of households within a targeted service area established memberships in a mature market.

By 2012 for the University of Cincinnati, it would seem reasonable to anticipate that membership could reach 1,000-3,000 individuals and for the City of Cincinnati CBD membership (based on residential use only) would be 200-500 individuals. Such rates of membership could result in a reduction in the ownership and regular use of 2,000-5,000 private automobiles. This does not include any potential use of such a system to augment or supplant the City's municipal vehicle fleet. Due to the lack of uniformity across systems and varying conditions from market to market, it is difficult to quantify the potential reduction in green house gas emissions. If one were to assume that 2,000 vehicles were driven at half the typical 10,000 miles annually with an estimated emission rate of 1 lb of CO<sub>2</sub> equivalent per mile, the result would be an annual reduction of approximately 5,000 tons of CO<sub>2</sub>. While this reduction would be very modest in regional terms, a car sharing program's other benefits also serve to promote reductions in vehicular use and increased use of alternative modes of travel including walking, biking and public transit.

**Implementation responsibilities/assignments –**

- The City of Cincinnati
- SORTA
- OKI
- The University of Cincinnati
- Other local agencies (including private sector) focused on environmental stewardship, transportation and urban economic and residential development

We recommend further study to determine the most practical operating model for the City (implementation either through a local non-profit partnership or via a commercial operator). The City must also review its current financial, regulatory and legal policies regarding land use, parking, marketing, and taxation as it would apply to car sharing. The City should also monitor the success of car sharing operations in Columbus and Cleveland to determine if there are any cultural and demographic characteristics or statewide policies that are incentives or detrimental to viability of car sharing operations in the State of Ohio.

**Cost to implement/net savings from implementation** – Implementation of a car sharing program typically requires a year before the program is sustainable, and private for-profit operators indicate that \$1,000,000 in initial investment is required before a program is self-sustaining. In most cases, the operator will form some type of public-private partnership to coordinate and share marketing responsibilities.

There are some issues that local host communities or institutions must resolve including provision for parking (on or off street) of car sharing vehicles. Some communities have also had to review their tax policies regarding automobile "rentals" and how it applies to the car sharing model.

Climate Protection Transportation Task Team – Shared Car Service (continued)**Multiple benefits anticipated (in addition to greenhouse gas reductions) –**

- Supports urban living and less reliance on automobiles

**Timeline for implementation** – An in depth study of car sharing and City policies could be completed in 6 months. An RFP for operation of car sharing operation in CBD or Uptown could be issued 6 months following the initial study. Joint marketing and initial startup-implementation could occur 1 year following establishment of the operator. Market maturity and potential expansion would take 2-4 years following establishment of an operator.

## Climate Protection Transportation Task Team Green Locomotives

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 6

The City should support the conversion of existing railroad locomotives to “Genset” locomotives.

#### **Estimated Annual GHG Reduction**

**2,168 tons of CO2 per year**

**Summary of specific issues** – The railroad industry plays an important role in the nationwide transport of people and goods. There are two types of railroad locomotives: line haul locomotives, which move freight or passengers across long distances, and switcher locomotives. Switcher locomotives move railcars within a railroad yard. Switchers are powered by diesel engines that are frequently left idling when not in use, wasting fuel and releasing pollutants into the air.

**Strategy/action plan** – The City should support the efforts of the Ohio Rail Development Commission to assist Norfolk Southern and CSX Transportation in acquiring three Genset switcher locomotives each, and the Indiana and Ohio Railroad in acquiring two. These locomotives would operate in the railroad yards in Cincinnati.

**Estimated greenhouse gas reduction to be achieved** – The Union Pacific Railroad was the first railroad to obtain Genset switchers. Union Pacific began planning for a prototype Genset switcher locomotive in 2002. That prototype was delivered to UP in December 2005. In January 2007, the railroad received the first of 60 production Genset locomotives that will operate in the Los Angeles area. The new 2,100 horsepower locomotives are powered by three 700-horsepower ultra-low emission Tier 3-certified diesel engines that reduce emissions of nitrogen oxides by 80 percent and particulate matter by 90 percent, while using as much as 16 percent less fuel compared to current low-horsepower locomotives. The fuel savings of a Genset switcher also translates into at least 16 percent fewer greenhouse gas emissions.

Union Pacific has also begun converting some of its yard switchers to “hybrid” switchers. In this case, the locomotive is powered by large banks of storage batteries. When the locomotive is not running, a small low-emission diesel engine on board recharges the batteries.

Each Genset locomotive saves 271 tons of CO2 per year. With eight locomotives being sought for the area, a total of 2,168 total tons of CO2 would be saved per year.

#### **Implementation responsibilities/assignments** –

- Ohio Rail Development Commission
- CSX Transportation
- Norfolk Southern Corporation
- Indiana and Ohio Railroad

**Cost to implement/net savings from implementation** – The cost of each Genset locomotive is \$1.5 million, making the total cost of purchasing eight locomotives for the area \$12 million.

#### **Multiple benefits anticipated (in addition to greenhouse gas reductions)** –

- Sixteen percent reduction in fuel consumption
- Eighty percent reduction in nitrogen oxides emitted
- Ninety percent reduction in particulate matter emitted

**Timeline for implementation** – Implementation will be dependent upon funding.

## Climate Protection Transportation Task Team Electric Car Dealership

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 7

The City should assist and incentivize the establishment of a local dealership for plug-in electric cars.

**Estimated Annual GHG Reduction** **1,047 tons in 2012; 5,534 tons in 2028**

**Summary of specific issues** – There are at least 3 companies that currently mass produce and market affordable all-electric vehicles. These vehicles are available from dealerships located across the country, but not presently in Cincinnati. As an example, the dealership located in New London, Ohio, near Cleveland, sold almost 100 vehicles in 2007 and expects to sell 200 in 2008.

These vehicles are legal to operate on public streets, but are not what most people would consider “real cars.” They have limited speeds (25-40 mph max.) and limited ranges (25-60 miles per charge), but they are suitable for a number of specific applications, including use as a commuting car for a member of a 2 car family, or for specific applications within a government or corporate fleet. The vehicles come in a 4-passenger or pickup truck configuration.

Electric cars emit significantly less GHG per mile than conventional vehicles, even when one charges the vehicle using coal generated electricity.

Vehicles can be viewed at [www.zapworld.com](http://www.zapworld.com), [www.zenncars.com](http://www.zenncars.com), and [www.mileselectricvehicles.com](http://www.mileselectricvehicles.com).

**Strategy/action plan** – The City should work with private partners, electric car advocates, and Duke Energy to support the establishment of an electric car dealership in Cincinnati. The goal will be to establish the dealership in 2008, sell 100 vehicles to the Cincinnati market in 2009, and increase the fleet by 200 vehicles per year from 2010 onward. Each vehicle will be used for an average of 5,000 miles per year. These assumptions are extremely conservative, as vehicle speeds, ranges and durability are expected to increase over the next few years, creating a larger market niche for these vehicles.

**Estimated greenhouse gas reduction to be achieved** – If 700 vehicles were in use by 2012, and these 700 vehicles averaged 5,000 miles each, this would total 3.5 million vehicle miles that year, or 1,461 tons of CO<sub>2</sub> avoided. However, the E-car uses 936 kwh per 5,000 miles. Multiplied by 700 vehicles, this would be equivalent to 655,200 kwh in 2012, or 414 tons of CO<sub>2</sub> produced. Subtracting this number from the original 1,461 tons of CO<sub>2</sub> avoided results in a net savings of 1,047 tons of CO<sub>2</sub> avoided in 2012.

If 3,700 vehicles were in use by 2028, and these 3,700 vehicles averaged 5,000 miles each, this would total 18.5 million vehicle miles that year, or 7,722 tons of CO<sub>2</sub> avoided. However, the E-car uses 936 kwh per 5,000 miles. Multiplied by 3,700 vehicles, this would be equivalent to 3,463,200 kwh in 2028, or 2,188 tons of CO<sub>2</sub> produced. Subtracting this number from the original 7,722 tons of CO<sub>2</sub> avoided results in a net savings of 5,534 tons of CO<sub>2</sub> avoided in 2028.

Implementation responsibilities/assignments –

- Office of the City Manager, Economic Development Division
- Office of Environmental Quality
- Duke Energy
- Green Energy Ohio

Climate Protection Transportation Task Team – Electric Car Dealership (continued)

**Cost to implement/net savings from implementation** – The cost to establish a dealership, including initial inventory of 10 vehicles, is expected to be less than \$250,000. A 10% subsidy of start-up costs would cost the City \$25,000. This is a profitable small business opportunity that would create jobs and generate economic activity. Each vehicle retails for approximately \$12,000, which is less than the price of a comparable gasoline vehicle. Operating costs are 2-3 cents/mile, significantly less than the cost to operate a gasoline vehicle.

**Multiple benefits anticipated (in addition to greenhouse gas reductions) –**

- Improvement in personal health
- Reduction in air pollution
- Reduced use of natural resources

**Timeline for implementation** – A dealership could be established in 2008. The goal would then be to sell 100 vehicles to the Cincinnati market in 2009, and increase the fleet by 200 vehicles per year from 2010 onward.

## Climate Protection Transportation Task Team Idle Reduction Campaign

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 8

The City should participate in the EPA's National Idle Reduction Campaign and educate the public about the importance of engine idle-reduction practices.

#### **Estimated Annual GHG Reduction**

**78+ tons per year**

**Summary of specific issues-** Idling consumes more fuel than turning a vehicle engine off and on again, and contributes to pollution. A single vehicle dropping off and picking up children at one school emits an average of three pounds of pollution into the air each month.<sup>6</sup> Ending unnecessary vehicle idling is an easy way for citizens to play a role in improving air quality and respiratory health in our city.

**Strategy/action plan-** The City should work with Hamilton County's DOES Air Quality Division to encourage the creation of mandatory "No Idle Zones" at all schools within Hamilton County in order to eliminate both school bus and care-giver idling. Work with schools to implement idle-reduction education and outreach programs for parents. Work with the Cincy USA Regional Chamber of Commerce to provide idle reduction outreach programs for local businesses. Work with OKI on an anti-idling public education program as a new component to OKI's Do Your Share for Cleaner Air.

**Estimated greenhouse gas reduction to be achieved—** There are 47 elementary schools within the Cincinnati Public School district alone. If even 100 diesel school buses reduced their idling by ten minutes each day, 33,570 lbs of CO<sub>2</sub> emissions could be avoided each year. If ten care-givers at each school eliminated idling while picking up or dropping off children, an additional 12,690 lbs would be avoided. If an additional 500 citizens reduced their idling by 5 minutes a day, the annual CO<sub>2</sub> savings would be 110,000 lbs of CO<sub>2</sub>.<sup>7</sup> These three initiatives alone total a savings of 156,260 lbs of CO<sub>2</sub> (78 tons) per year.

#### **Implementation responsibilities/assignments-**

- City of Cincinnati Office of Environmental Quality
- Hamilton County's DOES Air Quality Division

**Cost to implement/net savings from implementation—** There would be minimal cost to implement a campaign. If 100 diesel school buses reduced their idling by ten minutes each day, it would result in a savings of 1,500 gallons of gas per year. A driver of a small engine car that reduces idling by 5 minutes each day would save approximately \$30 per year on gasoline (assuming a price of \$3.15/gallon of gas).<sup>8</sup>

**Multiple benefits anticipated (in addition to greenhouse gas reductions) -** "No Idle Zones" at schools would decrease fine particulate matter pollution, known to aggravate conditions such as asthma.

**Timeline for implementation -** Idle reduction campaign toolkits are readily available online. Policies and programs could be implemented within a few months.

<sup>6</sup> Puget Sound Clean Air Agency, 2008.

<sup>7</sup> The Hinkle Charitable Foundation, 2008

<sup>8</sup> The Hinkle Charitable Foundation, 2008



## Climate Protection Transportation Task Team Increase Bicycle Use

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 9

The City should collaborate with regional bicycling advocates in order to increase bicycle use as a mode of transportation.

#### **Estimated Annual GHG Reduction**

**6,300 tons/year**

**Summary of specific issues** – For more than 15 years the City of Cincinnati has worked to include bicycle facilities as a part of new bridges/viaducts, new streets and street repair/restriping in accordance with federal Department of Transportation and American Association of State Highway and Transportation Officials (AASHTO) guidelines. Staff from the City’s Bicycle Transportation Program has worked in partnership with the Bicycle/Pedestrian Advisory Committee (Bike/PAC) to ensure implementation of these bicycle facilities. The Ohio River Trail, a proposed bike path into downtown from the Lunken Airport area, is a current example of collaboration between the City and Bike/PAC.

Bicycle rental/sharing services are offered by cities throughout Europe and the U.S. to improve air quality, decrease traffic congestion and for recreational use. Additional benefits include better health for citizens through increased exercise, creation of a more “convivial city atmosphere” and a decrease in noise pollution. The European CycloCity model is a public-private partnership providing bicycle rental service at a minimal cost to users.

Cincinnati’s weather and topography present many challenges to bicycle use as a mobility option. Metro is an obvious partner in overcoming these challenges and expanding bicycle use in our region. All Metro buses are equipped with bike racks, and the current bike and ride service could be promoted through an advertising campaign and enhanced website.

**Strategy/action plan** – The City should promote bicycle transportation funding through various departments. This funding will ensure continued progress on construction and maintenance of bike facilities, and will enable the City to partner with local advocates to encourage the promotion of bicycling as a safe, accepted alternative form of transportation. Efforts may include:

- Continue funding for the Bicycle Transportation Program, which provides staff support to Bike/PAC and funds small projects (i.e. bike rack requests);
- Supporting the development of the Ohio River Trail, Little Miami Scenic Trail, and Mill Creek with our regional partners;
- Promoting Cincinnati Recreation Commission’s bicycle rental service at Sawyer Point and Lunken Airport for recreation and transportation;
- Assessing the feasibility of a low-cost bike rental service with stations located throughout the City;
- Collaboration with Metro to promote “bike to work” trips and access to bike trails;
- Collaboration with local bicycle shops and cooperatives to increase public education and awareness of bicycle alternatives.

Climate Protection Transportation Task Team – Increase Bicycle Use (continued)

**Estimated greenhouse gas reduction to be achieved** – There are currently approximately 5,000 “bike to work” trips per day in Hamilton County (.15%). If this number were increased to 23,000 trips per day (.67%, still considerably below the national average), the resulting greenhouse gas savings would be 6,300 tons per year.

		<b>Current</b>	<b>Proposed</b>
Hamilton County Daily Person Trips (2005)		3,374,919	3,374,919
% of Hamilton Co. workers over 16 that bike to work	multiply by	.15%	.67% (St. Paul, MN)
	equals	5,000 bike trips/day	23,000 bike trips/day
Average bike trip length	multiply by	4.7 miles/trip	4.7 miles/trip
	equals	24,000 bike miles per day	108,000 bike miles per day
Regional average vehicle occupancy	divide by	1.34 persons/vehicle	1.34 persons/vehicle
	equals	18,000 vehicle miles per day averted	81,000 vehicle miles per day averted
CO <sub>2</sub> emission factor	multiply by	454 grams/mile	454 grams/mile
CO <sub>2</sub> averted	equals	8,172,000 grams CO <sub>2</sub> /day	36,774,000 grams CO <sub>2</sub> /day
Grams in a ton	divide by	907,185.5	907,185.5
	equals	9 tons/day averted	40.5 tons/day averted
5 days/week x 40 weeks of bike weather per year	multiply by	200 days per year	200 days per year
<b>Tons of CO<sub>2</sub> averted per year</b>	<b>equals</b>	<b>1,800 tons/year</b>	<b>8,100 tons/year</b>

Source: OKI Regional Council of Governments, EPA.

**Implementation responsibilities/assignments –**

- The City’s Climate Protection Coordinator
- Bike/PAC
- Cincinnati Cycle Club
- Local bicycle shops and cooperatives
- Cincinnati Recreation Commission
- Cincinnati Park Board
- Metro

**Cost to implement/net savings from implementation** – A small amount of staff time would be required from the Office of Environmental Quality in order to collaborate with existing agencies on public outreach promotion and tracking response. The cost for a part-time city transportation engineer and part-

Climate Protection Transportation Task Team – Increase Bicycle Use (continued)

time support staff to evaluate bicycle/ pedestrian facilities for the Bicycle Transportation Program is approximately \$50,000/year.

**Multiple benefits anticipated (in addition to greenhouse gas reductions) –**

- A more convivial city atmosphere
- Better citizen health through increased exercise
- Increased acceptance of bicycling as a safe alternative form of transportation
- Decreased noise pollution
- Less degradation to the city infrastructure
- Growth of businesses due to better accessibility

**Timeline for implementation** – An initial collaborative strategy could be defined within six months. Intense public education could occur during the next 6 months. Implementation of trails will be contingent upon availability of funding.

## Climate Protection Transportation Task Team Ride Share Program

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 10

The City should work with the Ohio-Kentucky-Indiana Regional Council of Governments to promote RideShare programs for citizens and workers in Cincinnati.

<b>Estimated Annual GHG Reduction</b>	<b>Between 100.3 and 4,010 tons per year</b>
---------------------------------------	----------------------------------------------

**Summary of specific issues** –Sharing the drive to work can help decrease traffic congestion, fuel consumption, GHG emissions and commuting expenses. At the present time, about 16% of Cincinnati commuters share a ride to work. This is slightly above the national figure of 15%. The Ohio-Kentucky-Indiana Regional Council of Governments (OKI) has a free ride share program through which car pools can be arranged. More than 1,000 commuters are in the data base. To help locate people interested in car pooling, an application can be obtained via telephone or on-line; OKI will follow-up with information and assistance. The RideShare program also offers van pooling for 7 – 15 people in leased vans. OKI provides a subsidy to keep costs down and assistance in setting up the van pool. A volunteer van pool driver manages the smooth operation of the service including maintaining a schedule, maintaining the van and collecting fees. There are 229 commuters in 18 vans operating in the region saving 264,600 VMT. A guaranteed ride home emergency service is included in the RideShare program.

**Strategy/action plan** – Cincinnati's Climate Protection coordinator could work with OKI to implement a Ride Share Program for city employees. OKI could perform a cluster analysis for all city employees. The city promotion of the program would be a key to success along with offering incentives for employees who use the service. Rewards could include preferential parking, public recognition, token prizes, or a tax incentive. Once established, the coordinator could monitor the number of employees participating, VMT saved, and ongoing promotion of the program.

To complement this program for City employees, the Coordinator could also work with area businesses to promote a RideShare program.

**Estimated greenhouse gas reduction to be achieved** – If an additional 1% of the City government's workforce commuted by carpool or vanpool, the GHG savings would be: 60 employees x 16 miles/day x 250 days/year = 240,000 vehicle miles avoided. At 1 ton for every 2,394 miles driven, this equals 100.3 tons/year. If an additional 1% of all Cincinnati commuters shared a ride to work, the GHG savings would be: 2,400 employees x 16 x 250 / 2394 = 4,010 tons/year.

#### Implementation responsibilities/assignments –

- Office of Environmental Quality
- Ohio-Kentucky-Indiana Regional Council of Governments

**Cost to implement/net savings from implementation** – There is no cost to the individual to set up a car pool. The monthly lease of a van depends on the size and number of miles driven. Initial administrative costs would be needed to establish the program perhaps through departments followed by monitoring the response.

Climate Protection Transportation Task Team – Ride Share Program (continued)**Multiple benefits anticipated (in addition to greenhouse gas reductions) –**

- Reduced traffic congestion
- Improved air quality
- Conserved natural resources
- Saved money

**Timeline for implementation** – An initial draft with program details, ways to promote and advertise, and rules and responsibilities could be created within 3 months. The new program would then be implemented with indefinite timelines.

## Climate Protection Transportation Task Team Community Fuel Efficiency

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 11

The City should work with the Cincinnati USA Regional Chamber and business associations to initiate diverse fuel efficiency plans in the private sector. Additionally, the City should fund an outreach effort geared toward educating the general public about improving fuel efficiency and efficient driver behavior.

#### Estimated Annual GHG Reduction

**Not immediately quantifiable**

**Summary of specific issues** – Operation of motor vehicles adds to local air quality problems and results in greenhouse gas emissions. The impact of ground-level ozone, particulate matter pollution and greenhouse gas affects breathing air, food, water resources, biodiversity and the ecosystem. In 2007, the Greater Cincinnati region was under a smog alert for high pollution levels for a total of 27 days - the highest in the past 12 years.

Americans represent five percent of the world's population but contribute 45 percent of the world's emission of carbon dioxide, the main pollutant that causes global warming. Carbon dioxide emissions from vehicles are disproportionately high in the United States for two primary reasons: U.S. drivers average 11,000 miles per year, 29 percent above the global average, and U.S. autos consume more fuel, emitting 15 percent more carbon dioxide per mile than the average vehicle in the rest of the world.<sup>9</sup>

Despite the substantial progress in reducing emissions from mobile sources nationwide, the congressionally mandated report from The National Academies' National Research Council found that more needs to be done to attain federal air-quality standards in many parts of the country relative to these sources (which include cars and light and heavy duty trucks; diesel-powered cranes, bulldozers, and tractors; and equipment such as lawnmowers that run on small gasoline engines). In December 2007, the United States saw the first increase in domestic auto fuel efficiency standards in more than three decades. The energy bill requires a 40 percent increase in vehicle fuel economy standards, raising the average fleet standard to 35 miles a gallon by 2020. The current standards are 27.5 mpg for cars and 22.2 mpg for SUVs and trucks. The gradual implementation of the tougher standards begins with the 2011 model year.

**Strategy/action plan** – With the development and implementation of the City's own "Green Fleet" action plan, the opportunity presents itself for the City to serve as a model to private sector fleets. The City should work with the Cincinnati USA Regional Chamber and business associations to identify and contact private sector fleets with the intent of assisting these fleets in developing diverse fuel efficiency plans and/or policies. The private fleet will conduct a thorough review of its entire fleet, develop an action plan with implementation timeline and enact the plan. Strategies to be considered in the plan include:

- Hybrid vehicle purchase
- Alternative fuel use
- Diesel truck retrofits
- Selection of smaller, more efficient vehicles when practical
- Driver behavior education, including an idling policy
- Subsidizing/incentivizing the use of transit and carpools
- Establishing a flex time policy

<sup>9</sup> Environmental Defense, 2007.

Climate Protection Transportation Task Team – Community Fuel Efficiency (continued)

In addition, the City should fund an outreach campaign aimed at educating the community-at-large about fuel efficiency. The City should host several workshops focusing on reducing car usage and improving vehicle maintenance as ways that the commuting population can assist in reducing GHG from automobiles. The workshop would also educate the public on idling issues and promote the purchase of more fuel efficient vehicles. The workshops would be held at various locations within the city, working through community and neighborhood associations.

**Implementation responsibilities/assignments –**

- The City of Cincinnati
- The Cincinnati USA Regional Chamber
- Business, community, and neighborhood associations

**Cost to implement/net savings from implementation** – Improving the energy efficiency of a fleet will result in GHG emission reduction and monetary savings.

**Multiple benefits anticipated (in addition to greenhouse gas reductions) –**

- Health and well-being
- Reduced incidence of respiratory disease and flare ups
- Improved air quality
- Noise reduction with use of hybrid vehicles.

**Timeline for implementation** – The City could begin working with private fleets within one year of the City's adoption and implementation of their "Green Fleet" action plan. Development of workshop materials could occur within one year with the intent of holding workshops soon after.

## Climate Protection Transportation Task Team Complete Streets

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 12

The City should ensure adequate funding for the construction, maintenance and rehabilitation of “Complete Streets.”

#### Estimated Annual GHG Reduction

Not immediately quantifiable

**Summary of specific issues** – “Complete Streets” are designed to provide safe and accessible use for pedestrians, cyclists, transit riders and operators of motor vehicles. Planners of a typical complete street would aim to include, as appropriate, amenities such as: sidewalks, bike lanes, wide shoulders, crosswalks, refuge medians, bus pullouts, bus lanes, audible pedestrian signals, and sidewalk bulb-outs.<sup>10</sup>

The maintenance and enhancement of funding for the City of Cincinnati sidewalks, bicycle, and hillside steps programs require an ongoing commitment. Approximately 1,700 miles of improved sidewalk space (i.e., frontages with paved walk and driveway surfaces) extend along 90% of City streets.. There are nearly 400 sets of City hillside stairways (not including those within the City Parks or Recreation properties). The hillside steps are an integral part of our City’s transportation system and provide a pedestrian-friendly connection to some areas of the City that are quite remote.

In some locations, space for pedestrians, bicycles, transit, automobiles, and greenspace in our built environment will require more right-of-way than currently exists. Widening the right-of-way typically cannot be achieved without destroying the character of the street.

In regards to sustainability and maintainability, maintenance costs will increase for additional gray and green infrastructure.

**Strategy/action plan** – The City should provide continued and enhanced funding for “Complete Streets,” which will in turn promote walking, cycling, and public transit. Streets that are safe and accessible to users of all ages and abilities are more likely to encourage alternative forms of travel (such as walking, cycling, etc).

**Estimated greenhouse gas reduction to be achieved** – Not quantifiable at this time

#### **Implementation responsibilities/assignments** –

- The City of Cincinnati Department of Transportation and Engineering (DOTE) will lead implementation of the Complete Streets recommendation.

**Cost to implement/net savings from implementation** – The City of Cincinnati Department of Transportation and Engineering (DOTE) is currently allocated \$500,000 per year for sidewalk maintenance, upgrade, etc. Although property owners are responsible for sidewalk upkeep in front of their property, DOTE is responsible for installation and maintenance of City owned locations. DOTE is allocated \$250,000 per year for maintenance of the hillside steps. DOTE’s bicycle program is allocated approximately \$150,000 per year for planning, design, and small miscellaneous work. The bicycle program also receives about \$400,000 per year in capital funds for trail projects and work such as inlet grate upgrades.

<sup>10</sup> [www.completestreets.org](http://www.completestreets.org) (March 2008)



Climate Protection Transportation Task Team - Complete Streets (continued)**Multiple benefits anticipated (in addition to greenhouse gas reductions) –**

- Improved pedestrian safety
- Increased walking/cycling connectivity
- Increase in options for recreation/exercise
- Promotion of transit usage via provision of good pedestrian connectivity

**Timeline for implementation** – The programs listed above are currently in place. These programs should be maintained and enhanced to achieve more complete streets over time.

## Climate Protection Transportation Task Team Expanded Light Rail Transit

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 13

The City should support the development of a regional light rail system.

#### Estimated Annual GHG Reduction

**97,912 net tons of CO<sub>2</sub> per year**

**Summary of specific issues** – Transportation is a large generator of greenhouse gases, much of it from personal cars and light trucks. Rail transit is a strategy to enable people to save money, avoid congested highways and improve communities by providing car-competitive public transportation that also stimulates urban growth in the form of dense, walkable neighborhoods. Reduction of greenhouse gases has historically not been an objective, and rail systems have not been designed with this in mind. To the extent that rail transit reduces transport-related greenhouse gases, it can be viewed as an important environmental strategy for urban transportation, which is otherwise a large and growing producer of greenhouse gases from cars and light trucks.

While the exact nature of the expansion has not yet been determined, the MetroMoves plan provides a good example of what such an expansion might look like. An electrically powered light rail system was proposed to Cincinnati and Hamilton County voters in 2002. The plan was composed of six rail lines totaling about sixty miles. Reliable ridership estimates were made. Explicit calculations for reductions in Vehicle Miles Traveled (VMT) were not calculated, however rough estimates are possible. No estimates have been made with respect to the sum of greenhouse gases that would enter the atmosphere from the generation of electricity used to power the light rail.

**Strategy/action plan** – The plan called for the construction of six light rail lines, five originating in Downtown Cincinnati and extending to Dent, Tri-County, Blue Ash, Newtown and the foot of the Taylor-Southgate Bridge just east of Downtown Cincinnati. A sixth light rail line would have connected the Dent line with the Newtown line, enabling people to go cross-county without having to go Downtown. Weekday ridership was estimated for each of the lines: 23,000 for the Blue Ash (I-71) Line; 20,000 for the Tri-County (I-75) Line; 18,000 for the Dent (I-74) Line; 10,000 for the Newtown (Eastern) Line; 1,000 for the I-471 (Southeast) Line; and 4,000 for the Cross-County Line – a total of 100,000 weekday riders in Hamilton County. Standard practice for estimating annual transit ridership is to multiply the weekday ridership by 300. Thus, the annual ridership from the six Hamilton County lines would be in the range of 30,000,000 trips, or 900,000,000 trips over the thirty-year life of the project. The American Public Transit Association estimates that the average trip on a light rail train is 4.5 miles. Accordingly, these data suggest that building light rail in Cincinnati would result in four billion passenger miles during the first thirty years of the system's operation.

The Federal Highway Administration estimates that car occupancies vary from an average of 1.08 persons per car for work trips and 1.90 persons per car for other kinds of trips. Since light rail transit is especially used for work trips, this analysis assumes an intermediate variable of 1.20 persons in each car trip that wouldn't be made because of the availability of light rail transit in Cincinnati. Thus, the four billion miles travelled on the light rail system in its first thirty years would result in 3.33 billion fewer Vehicle Miles Traveled.

**Estimated greenhouse gas reduction to be achieved** – According to the American Public Transit Association, "an average private vehicle emission rate is about 1.0 pound of CO<sub>2</sub> per mile," so every 2,000 VMT reduces CO<sub>2</sub> by one ton. Therefore, the Regional Rail Plan would reduce CO<sub>2</sub> by 1.66 million tons over thirty years, or 53,333 tons per year.

Climate Protection Transportation Task Team – Regional Rail Transit (continued)

There would be more gains from denser settlement patterns around the 35 light rail stations included in the plan. If each station were to gain 500 units of clustered, mixed-use housing and commercial development over thirty years, with each housing unit occupied by the Cincinnati average of 2.15 persons, then a total of 37,625 persons would be attracted to live within walking distance of a light rail station. This represents less than 5% of the current population of Hamilton County -- not an unreasonable expectation. Using ICLEI's personal CO2 emissions calculator for residents living in clustered mixed-use housing, we can assume an annual reduction of CO2 per person in the range of 2.7 tons compared to a typical resident living in a large house on a large lot who mostly drives alone and seldom uses public transportation. Thus, the aggregate CO2 reduction for residents of compact housing situated around the 35 light rail stations would be in the range of 101,588 tons of CO2 per year.

Light rail trains are powered by electricity, and its generation will produce greenhouse gases. The transit agency in Portland, Oregon states that it used 44,048,344 kWh of electricity in 2007 to propel its trains along 44 miles of double-tracked light rail lines, or about 1 million kWh of power per route-mile. Thus, the Regional Rail Plan would use 60 million kWh of power for its sixty miles of light rail routes. Using Duke Energy's factor of 1.9 pounds of CO2 for each kWh of power generated, the Regional Rail Plan will produce 114 million pounds -- or 57,000 tons -- of CO2 each year.

Adding it all up -- VMT reductions, changes in settlement patterns and the CO2 generated to propel the electric trains, there would be a net annual reduction of 97,921 tons of CO2 gained from the construction and operation of sixty miles of light rail transit in Hamilton County.

**Implementation responsibilities/assignments** -- The Southwest Ohio Regional Transit Authority has been the lead agency on this project.

**Cost to implement/net savings from implementation** -- The capital cost of the Regional Rail Plan was \$2.4 billion over thirty years, adjusted for the year of expenditure of funds, and it would cost about \$60 million per year to operate the sixty miles of light rail in Hamilton County. Revenue from fares, if estimated at \$1 per trip, would yield \$30 million annual as an off-set to the operating expenses.

**Multiple benefits anticipated (in addition to greenhouse gas reductions)** -- Ridership on rail transit is almost always higher than projections because trains are more car-competitive than buses. Higher fuel prices are driving more people to transit, especially light rail transit where ridership grew 6.1% last year across the nation. No electrically powered rail system that has opened for business since World War II has gone out of business. On the other hand, because the main benefit of highway improvements -- faster travel time -- erodes over time as more cars use the improved roadway, investments in rail transit could be viewed as less risky than highway investments.

In addition, the ridership estimates for *MetroMoves* were only performed on a line-by-line basis and did not consider the "network effects" of a complete regional rail system -- how the system becomes much more valuable when you can travel in every direction. We know from our own experience with highways that this is a major benefit.

**Timeline for implementation** -- Funding sources would need to be identified before further planning could begin.

## Climate Protection Transportation Task Team Expansion of Metro Bus Service (Regional Portion)

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 14

The City should support a significant expansion of Metro bus service within the Cincinnati region.

#### Estimated Annual GHG Reduction

#### Not Immediately Quantifiable

**Summary of specific issues-** Metro's route network provides extensive radial coverage within the City of Cincinnati, limited crosstown service within the City, and limited service coverage within non-city portions of Hamilton County and areas immediately adjacent to Hamilton County. This is a result of the funding arrangement for transit in southwest Ohio, which relies primarily on City of Cincinnati earnings tax revenues (dedicated to transit use by city voters in 1972) and the lack of a broader regional or countywide funding source, as is common nationwide and in Ohio. The result is a system that generally reflects the nature of the region, with a few exceptions, as it was in the early 1970s instead of 2008. The City should support a significant expansion of Metro bus service within the Cincinnati region. While the exact nature of that expansion has not yet been determined, the Metro Moves plan provides a good example of what such an expansion might look like. In 2002, the MetroMoves transit development plan developed a broad-based regional network of expanded transit service throughout Hamilton County and immediately adjacent areas. In addition to four routes and services that focused on the City of Cincinnati, the bus portion of the plan included the creation of several new services and facilities:

- 9 east-west or north-south crosstown routes providing direct suburb-to-suburb and neighborhood-to-neighborhood connections that do not require a trip to and transfer in downtown Cincinnati;
- 3 limited stop routes in major radial corridors providing fast service to the downtown and uptown areas of Cincinnati;
- 12 neighborhood shuttle routes providing small bus connections to local jobs, shopping, residential areas, and other opportunities;
- An overnight shuttle enhancing access to jobs;
- 29 transit hubs to enhance transit connections, provide high quality and safe passenger waiting areas, include park & ride at some locations, and provide tools to encourage neighborhood revitalization and enhancement;
- An expanded bus fleet, additional bus garage, new shelters, intelligent transportation systems, and other related operational improvements.

**Strategy/action plan-** A coalition should be formed to plan and promote a major expansion of bus service within Cincinnati. The MetroMoves plan, developed by the Southwest Ohio Regional Transit Authority (SORTA) was based on a high level of trip-making and demand analysis in addition to a major public involvement process. The plan, which included a regional light rail system, was subject to a ½ cent sales tax in Hamilton County that was defeated at the polls. Implementation of a regional MetroMoves bus expansion plan cannot be accomplished with existing funding programs and resources and would require a similar funding source to that proposed in 2002. MetroMoves could be used as a starting point for planning to enhance bus service.

**Estimated greenhouse gas emissions to be achieved**—Not Immediately Quantifiable. The 2002 MetroMoves Plan identified the annual miles of new service operated and the estimated annual passenger trips generated. It is estimated that 7.9 million annual vehicle miles traveled would be saved, significantly off-setting the VMT added by additional buses on the street. The buses are assumed to be biodiesel-electric hybrids.

Climate Protection Transportation Task Team – Expansion of Metro Bus Services (Regional Portion)  
(continued)

**Implementation responsibilities/assignments**

- SORTA/Metro

**Cost to implement/net savings from implementation—** For an expansion of bus service comparable in scope to the City portion of the MetroMoves bus expansion: The capital costs of the additional 52 buses needed to operate the regional component of the plan is approximately \$26 million. The remainder of the plan, including the network of major transit hubs, has a capital cost of \$74 million. The annual incremental operating cost is estimated at \$22.3 million, which could be partially off-set by fares (covering 20% of operating costs), resulting in a net annual incremental operating cost of \$17.8 million. Off-setting costs resulting from savings derived by personal auto trips avoided (VMT savings) would be \$3,989,500/year.

**Multiple benefits anticipated (in addition to greenhouse gas reductions)**

- Reduced consumption of petroleum
- Access to jobs and opportunities, thereby improving tax revenues and reduced social-related expenditures
- A more globally competitive region
- Less wear and tear of streets and highways
- Neighborhood revitalization based on leveraging the investment in neighborhood transit hubs
- Enhancement of the pedestrian environment and improved personal health that may result
- Quieter environment due to low-noise-emitting biodiesel-electric hybrid buses
- Improved access and quality of life for persons with disabilities

## Climate Protection Transportation Task Team The Ohio Hub Plan

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 15

The City should support the efforts of the Ohio Rail Development Commission (ORDC) to establish rail passenger service between major regional cities.

**Estimated Annual GHG Reduction** **18,000 tons of CO<sub>2</sub> over the entire Plan area**

**Summary of specific issues** – The Ohio Hub Plan is a proposed 860-mile passenger rail system that would serve over 22-million people in four states and southern Canada. The envisioned system would integrate with highway and local transit networks and directly connect to the region's international airports. The high speed trains proposed in the Ohio Hub Plan will divert passengers from other modes (air, conventional rail, automobile, and bus) to high speed rail.

**Strategy/action plan** – The City should support the efforts of the Ohio Rail Development Commission (ORDC) to establish rail passenger service between major regional cities, in particular Cincinnati, Cleveland, Columbus, and Dayton. The City should continue to assist in identifying potential routes and stations in the Cincinnati area.

**Estimated greenhouse gas reduction to be achieved** – The annual net emissions saved by implementing the Ohio Hub Plan (using high-speed rail technology) is 18,000 tons of CO<sub>2</sub> for the entire Plan area (not just Cincinnati). The estimate was made based on a methodology derived in a study entitled High Speed Rail and Greenhouse Gas Emissions in the U.S.

**Implementation responsibilities/assignments** – The Ohio Rail Development Commission is the sponsor of the project.

**Cost to implement/net savings from implementation** – The cost to implement the Ohio Hub Plan is \$3.3 billion. Substantial savings would be realized from avoided vehicle travel, economic development adjacent to rail stations, etc.

**Multiple benefits anticipated (in addition to greenhouse gas reductions)** - As an economic development project, the Ohio Hub would create thousands of new construction jobs, permanent operating and indirect jobs, and increase demand for U.S. manufactured materials and supplies. It is expected to have significant local, statewide, and regional economic impacts.

**Timeline for implementation** – The system could be fully built-out by 2015.

## **Appendix III**

### **Energy Task Team Recommendations**

## Climate Protection Energy Task Team Residential Energy Efficiency

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 1A-1

Reduction of Electric Use in the Residential Sector

#### Estimated Annual GHG Reduction

**10,200 tons per year in 2012**

**Summary of specific issues** – In Cincinnati a significant amount of the electricity used by residents is coal generated. A significant amount of GHG can be reduced by no and low cost measures with simple reduction of electric usage.

**Strategy/action plan** – Educate the residents of Cincinnati on the simple, low/no cost ways to reduce the electric consumption through an enhanced Cincinnati web site showcasing green strategies and useful links to Federal and State incentives and programs and yearly mailings of the Department of Energy's "Energy Savers" booklet. <http://www1.eere.energy.gov/consumer/tips/>. A multi-faceted education program will be used to educate residents about the advantages of energy conservation, as spelled out in Energy Task Team Recommendation 1B-1 on page 99. A multi-layered marketing plan will be employed to motivate behavior changes by citizens, as described in Advocacy Task Team Recommendation 2 on page 218.

**Estimated greenhouse gas reduction to be achieved** – Estimated GHG reductions from implementing this action item are stated below. For the CO<sub>2</sub> values listed the ICLEI Personal CO<sub>2</sub> calculator was used, link: [www3.iclei.org/co2/co2calc.htm](http://www3.iclei.org/co2/co2calc.htm)

These calculations are based on a 39% reduction in electric consumption with only about \$200 of investments and a slight change of habit. They are based on a real life example of a task team member. Items purchased included electric power strips, hard ducting vent for dryer, and CFL bulbs. Changes in habit included turning off power at strips for an entertainment center and computer, not running dish washer's "dry" mode, and diligently turning off lights when not in use.

Baseline Time Frame, before changes: 2/2006 to 1/2007

Electric Use:

25,461 kWh

**CO<sub>2</sub> Emissions:** **58,970 lbs or 29.5 Tons**

Current Time Frame, after \$200 investment and changes in habit: 2/2007 to 1/2008

Electric Use:

15,536 kWh

**CO<sub>2</sub> Emissions:** **53,639 lbs or 26.8 Tons**

CO<sub>2</sub> Emission Reduction **2.7 Tons** for one household

**CO<sub>2</sub> Emission Reduction: 10,200 Tons if 5% of households (151,000 x 5% = 7550) achieved half the savings suggested in this example (1.35 Tons of CO<sub>2</sub>).**

#### **Implementation responsibilities/assignments –**

- Office of Environmental Quality
- City Climate Strategy Management Team



Climate Protection Energy Task Team - Residential Energy Efficiency (continued)

**Cost to implement/net savings from implementation** – At \$200 per household and 5% adoption rate in Cincinnati the cost: \$1,510,000. Cost to the City would be yearly mailings to 151,000 residences. The savings of 10,000 kwh per household will save about \$1000 per household per year, repaying the investment in under 3 months.

**Multiple benefits anticipated (in addition to greenhouse gas reductions)** – The fiscal benefits could have as big an impact on the local economy as the GHG reductions. As the electric usage in a home decreases, their cash flow will increase.

**Timeline for implementation** – Web site improvements could be completed by the end of the year. Mailings could happen by the end of this year.

## Climate Protection Energy Task Team Promote the Installation of Programmable Thermostats

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 1A-2

Encourage Residents to use Programmable Thermostats.

#### Estimated Annual GHG Reduction

**35,000 tons of CO2 in 2012**

**Summary of specific issues** – This initiative is two-fold. First is the idea of having programmable thermostats in every home in the City. By having programmable thermostats, people could then, easily be able to program their thermostats such that during sleeping hours, or times when the house is empty with people at work, the demand for heating and cooling for their homes would be lessened substantially. Secondly, greater control would make it easier for people to manage their energy usage. With this control, people will be able to make minor changes to the temperature settings in their home which would have a significant impact on GHG's and their wallet.

**Strategy/action plan** – Education through an enhanced Cincinnati web site showcasing green strategies and useful links to Federal and State incentives and programs. Yearly mailings of the Department of Energy's "Energy Savers" booklet. <http://www1.eere.energy.gov/consumer/tips/>. A multi-layered marketing plan will be employed to motivate behavior changes by citizens, as described in Advocacy Task Team Recommendation 2 on page 218.

**Estimated greenhouse gas reduction to be achieved** – The energy it takes to heat and cool a home accounts for roughly half of the overall energy usage for the average home. By combining the efforts of setting back temperatures during sleeping hours and other times of non-use to 60 degrees, and by making a 5 degree change in the "normal" temperature settings. For example, from 72 degrees to 67 degrees, an average family could save approximately 14% on their energy usage.

The 14% comes from two numbers. As a rule of thumb, for each degree of change from "normal" temperature settings, a 1-2% energy savings is realized. If people reduced their "normal" temperature setting by 5 degrees, they would save 5-10% on their energy costs. By using a setback temperature on the programmable thermostat that is 7 degrees lower than normal for 16 hours per day, it would save an additional 4 – 8% in energy usage. Adding the two generates an average of 14%

To keep things simple, let's use kWh as the overall metric for energy usage. The average home uses 24,000 kWh in energy each year. With a 14% savings, that would equate to 3,360 kWh of energy savings.

This would equate to 2.335 Tons of CO2. Assuming that an additional 10% of homes in Cincinnati adopt programmable thermostats by 2012, multiply 10% x 150,000 households x 2.335 tons per home equates to 35,000 tons of CO2 reduction.

#### Implementation responsibilities/assignments –

- Office of Environmental Quality
- City Climate Strategy Management Team

**Cost to implement/net savings from implementation** –For residents, a self install is about \$50. If a contractor is needed, the cost would be between \$100 and \$150. 15,100 households x 100/household = \$1.5 million dollars. The annual cost savings for the reduced energy consumption would be around \$335 dollars, thus paying for itself easily within the same calendar year. For the City the cost of marketing and yearly mailings to 151,000 residences will need to be determined.

Climate Protection Energy Task Team - Promote the Installation of Programmable Thermostats  
(continued)

**Multiple benefits anticipated (in addition to greenhouse gas reductions) –**

- As the electric usage in a home decreases, citizen's cash flow increases which is a benefit to the local economy.

**Timeline for implementation** – Web site improvements could be completed by the end of the year. Mailings could happen by the end of this year.

## Climate Protection Energy Task Team Cold Water Washing

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation #1A-3

Encourage Residents to use cold water only in washing machines.

#### Estimated Annual GHG Reduction

**1,314 Tons in 2012**

**Summary of specific issues** – The City can reduce energy consumption by encouraging residents to use cold water only in washing machines.

**Strategy/action plan** – Educate the residents of Cincinnati on this simple action that can reduce energy use. According to the Department of Energy, 80% of the energy used in clothes washing comes in the heating of the water.

<http://www.eere.energy.gov/buildings/emergingtech/page2g.html>

[http://www.energystar.gov/ia/partners/manuf\\_res/bernstudy.pdf](http://www.energystar.gov/ia/partners/manuf_res/bernstudy.pdf) Education can occur through an enhanced Cincinnati web site showcasing green strategies and useful links to Federal and State incentives and programs and yearly mailings of the Department of Energy's "Energy Savers" booklet.

<http://www1.eere.energy.gov/consumer/tips/>. A multi-layered marketing plan will be employed to motivate behavior changes by citizens, as described in Advocacy Task Team Recommendation 2 on page 218.

**Estimated greenhouse gas reduction to be achieved** – For the CO<sub>2</sub> values listed the ICLEI Personal CO<sub>2</sub> calculator was used, link: [www3.iclei.org/co2/co2calc.htm](http://www3.iclei.org/co2/co2calc.htm)

These calculations are based on an 80% reduction in electric consumption with the average use of 1kWh per load, 3 loads per week, with 1.39lbs per kWh.

#### Baseline Time Frame:

Electric Use:	156 kWh
CO <sub>2</sub> Emissions:	217 lbs

#### Without Hot water Time Frame:

Electric Use:	31 kWh
CO <sub>2</sub> Emissions:	43 lbs

CO<sub>2</sub> Emission Reduction 174 lbs for one household

CO<sub>2</sub> Emission Reduction: 1,314 Tons if adopted by 10% of 151,000 Cincinnati households

#### **Implementation responsibilities/assignments –**

- Office of Environmental Quality
- City Climate Strategy Management Team

**Cost to implement/net savings from implementation** – cost of marketing and yearly mailings to 151,000 residences

Climate Protection Energy Task Team - Cold Water Washing (continued)**Multiple benefits anticipated (in addition to greenhouse gas reductions) –**

- As the electric usage in a home decreases, citizen's cash flow increases which is a benefit to the local economy.

**Timeline for implementation** – Web site improvements could be completed by the end of the year. Mailings could happen by the end of this year.

## Climate Protection Energy Task Team Air-Dry Dishwasher

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 1A-4

Encouraging Residents to allow dishes to air-dry in the dishwasher

#### Estimated Annual GHG Reduction

**1,952 tons in 2012**

**Summary of specific issues** – The City can reduce energy consumption by encouraging Residents to allow dishes to air-dry in the dishwasher.

**Strategy/action plan** – Educate the residents of Cincinnati on this simple action that can reduce energy use. According to the California Energy Commission's Consumer Energy Center, 15-50% of the energy used in the dishwashing process can be saved by air-drying the dishes.

<http://www.consumerenergycenter.org/home/appliances/dishwashers.html>. Education methods will include: an enhanced Cincinnati web site showcasing green strategies and useful links to Federal and State incentives and programs; Yearly mailings of the Department of Energy's "Energy Savers" booklet. <http://www1.eere.energy.gov/consumer/tips/>. A multi-layered marketing plan will be employed to motivate behavior changes by citizens, as described in Advocacy Task Team Recommendation 2 on page 218.

**Estimated greenhouse gas reduction to be achieved** – Estimated GHG reductions from implementing this action item are stated below. For the CO<sub>2</sub> values listed, the ICLEI Personal CO<sub>2</sub> calculator was used, link: [www3.iclei.org/co2/co2calc.htm](http://www3.iclei.org/co2/co2calc.htm)

These calculations are based on a 32.3% reduction in electric consumption with the average use of 573 kWh per 264 loads per year with 1.39 lbs of CO<sub>2</sub> per kWh.

Baseline Time Frame:

Electric Use: 573 kWh  
CO<sub>2</sub> Emissions: 796.47 lbs.

Without Hot Water Time Frame:

Electric Use: 387 kWh  
CO<sub>2</sub> Emissions: 537.93 lbs

CO<sub>2</sub> Emission Reduction 258.54 lbs for one household

**CO<sub>2</sub> Emission Reduction: 1952 tons if adopted by 10% of Cincinnati's 151,000 households**

**Implementation responsibilities/assignments** –

- Office of Environmental Quality
- City Climate Strategy Management Team

**Cost to implement/net savings from implementation** – cost of yearly mailings to 151,000 residences

**Multiple benefits anticipated (in addition to greenhouse gas reductions)** –

- As the electric usage in a home decreases, citizen's cash flow increase which is a benefit to the local economy.

Climate Protection Energy Task Team – Air Dry Dishwasher (continued)

**Timeline for implementation** – Web site improvements could be completed by the end of the year. Mailings could happen by the end of this year.

## Climate Protection Energy Task Team Water Heater Blanket

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 1A-5

Encourage citizens to install insulating blankets on water heaters and verify that heater is set at 120°F and not higher.

#### Estimated Annual GHG Reduction

**6,417 tons in 2012**

**Summary of specific issues** – A significant amount of electricity, natural gas, or propane is used by residents of Cincinnati for hot water generation purposes. A significant amount of GHG can be reduced by reduction of electric and/or fuel usage. This reduction can be achieved by installing insulating blankets or maintaining adequate water temperature.

**Strategy/action plan** – Educate the residents and businesses of Cincinnati on cost savings and GHG reduction which can be achieved by installing insulation and maintaining adequate water temperature. Education methods will include: an enhanced Cincinnati web site showcasing green strategies and useful links to Federal and State incentives and programs and ; yearly mailings of the Department of Energy’s “Energy Savers” booklet. <http://www1.eere.energy.gov/consumer/tips/>. A multi-layered marketing plan will be employed to motivate behavior changes by citizens, as described in Advocacy Task Team Recommendation 2 on page 218.

**Estimated greenhouse gas reduction to be achieved** – An emissions reduction of 850 lbs/year will result from each household due to implementation of this recommendation. If implemented by 10% of the City’s 151,000 households, the emission reduction would be 6,417 tons/year.

**Cost to implement/net savings from implementation-** For residents, cost to install additional insulation will be approximately \$50 per household and this cost can be recovered by energy savings in less than one year. For the City, cost will be for marketing and yearly mailings to 151,000 residences.

#### **Multiple benefits anticipated (in addition to greenhouse gas reductions) –**

- As the electric usage in a home decreases, citizen’s cash flow increases which is a benefit to the local economy.

**Timeline for implementation** – Web site improvements could be completed by the end of the year. Mailings could happen by the end of this year.



## Climate Protection Energy Task Team Energy Star for Residential Construction

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 1A-6

Encourage all new residential construction to meet Energy Star standards

#### Estimated Annual GHG Reduction

**500 tons by 2012/2500 tons by 2028**

**Summary of specific issues** – To earn an Energy Star rating, a home must meet guidelines for energy efficiency set by the U.S. Environmental Protection Agency. These homes are at least 15% more energy efficient than homes built to the 2004 International Residential Code (IRC), and include additional energy-saving features that typically make them 20–30% more efficient than standard homes. It is mandatory that all homes built in Ohio must meet International Energy Conservation Code (IECC codes). ResCheck must show compliance.

Construction, maintenance and operation of buildings is responsible for about 48% of the GHG produced in the US. (according to the AIA). We can significantly reduce this effect by encouraging all new residential construction to meet Energy Star standards. The average new home constructed in the US produces about 9,000lbs of GHG annually, according to ICFI who provides consulting services to Energy Star.

**Strategy/action plan** – Create a work group to develop a package of incentives and disincentives that will encourage new residential construction to meet Energy Star standards.

**Estimated greenhouse gas reduction to be achieved** – The average newly built home produces about 9,000 lbs of GHG annually. Energy Star requires a 15% reduction beyond the IECC codes.

Avg. New Home Built in : 1/2006 to 12/2006

2,500 sq. ft.

**CO<sub>2</sub> Emissions:** 9,000 lbs annually

Avg. New Home built to minimum Energy Star standards

2,500 sq. ft.

**CO<sub>2</sub> Emissions:** 7,600 lbs annually

#### **CO<sub>2</sub> Emission Reduction:**

CO<sub>2</sub> Emission Reduction 1,450 lbs for each new home built. With an average of 175 new homes constructed in Cincinnati annually, this measure would reduce the GHG production within Cincinnati by 253,750 lbs or 125 tons annually.

**Implementation responsibilities/assignments** – City of Cincinnati Planning Department in conjunction with Home Builders Association of Greater Cincinnati.

**Cost to implement/net savings from implementation** – Monetary cost to City is nominal, depending on the incentives the City decides to offer.

Climate Protection Energy Task Team - Energy Star for Residential Construction (continued)**Multiple benefits anticipated** (in addition to greenhouse gas reductions)

Increased strength of discretionary funds within local economy due to dollars saved on utilities by new homeowner.

**Timeline for implementation – 2008**

## Climate Protection Energy Task Team Free Compact Fluorescent Light (CFL) Bulbs

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 1A-7

Provide free compact fluorescent light (CFL) bulbs to citizens similar to a Chicago Program already in place.

#### **Estimated Annual GHG Reduction**

**3,125 tons**

**Summary of specific issues** – Government to make available free compact fluorescent bulbs to low income citizens, Chicago's Smart Bulb Program has done this by partnering up with the Northern Illinois Energy Project (NIEP) and Midwest Energy Efficiency Alliance. The bulbs are then distributed throughout the City. Distributing free bulbs to citizens introduces them to a new technology, saves them money on their utility bills, and is a great outreach tool for education.

[http://egov.cityofchicago.org/city/webportal/portalDeptCategoryAction.do?deptCategoryOID=-536898513&contentType=COC\\_EDITORIAL&topChannelName=Dept&entityName=Environment&deptMainCategoryOID=-536887205](http://egov.cityofchicago.org/city/webportal/portalDeptCategoryAction.do?deptCategoryOID=-536898513&contentType=COC_EDITORIAL&topChannelName=Dept&entityName=Environment&deptMainCategoryOID=-536887205)

**Strategy/action plan** – In Cincinnati an initial program might distribute 10,000 bulbs, which would have a maximum cost, if purchased at retail, of approximately \$35,000. Perhaps a good partner for an outreach program similar in scope would be with GE. OEQ would need to reach out to GE to secure bulbs for free or possibly at cost. Funding would need to be provided by Council. Local neighborhood community groups (Price Hill Civic Club, East Price Hill Improvement Association) should be charged with the responsibility of distributing bulbs to citizens.

**Estimated greenhouse gas reduction to be achieved** – According to the ENERGY STAR website, [www.energystar.gov](http://www.energystar.gov), the energy saved over the life of a typical 60 watt CFL bulb is 450 KWh or 4.5 million KWh for the program. If all bulbs displace conventional units, the program savings would amount to 3,125 tons of CO<sub>2</sub>. Hopefully this program would change future behavior so that recipients would continue to use CFLs.

#### **Implementation responsibilities/assignments** –

- Office of Environmental Quality
- Local Neighborhood Community Groups

**Cost to implement/net savings from implementation** – Any initial costs to the City for the purchase of the bulbs would need to be negotiated with a partner, perhaps GE. The life cycle savings in energy costs for each bulb recipient is \$65 thus resulting in a program savings of \$650,000.

**Multiple benefits anticipated (in addition to greenhouse gas reductions)** – Installation of CFLs will no doubt save citizens money and will act as an educational tool as well.

**Timeline for implementation** – Capital funding for this could be included in the 2009 budget.

## Climate Protection Energy Task Team “Green Loan” Home Financing

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 1A-8

Offer “Green Loan” financing for home energy improvements paid for by utility savings, through creation of community-owned Utility Lending Institution (ULI).

#### Estimated Annual GHG Reduction

**18,000 tons by 2012,/ 90,000 tons by 2028**

**Summary of specific issues** – Nearly every homeowner in Cincinnati budgets 1) money for their mortgage and 2) money for energy. By combining these two costs of ownership, homeowners can pay a lending institution for a higher performing home rather than pay a utility company to operate an inefficient home.

**Strategy/action plan** –Cincinnati would become shareholders of an alternative to the utility company. They create a community-owned institution that is part energy supplier and part bank. This Utility/Lending Institution (ULI) has two interests—conservation and home energy performance. The ULI defines about one dozen home energy upgrades that prequalify for “Green Loans”. These loans are used to finance home energy improvements which significantly reduce utility costs, (such as air sealing, insulation, ultra-efficient HVAC systems, solar water heating, geothermal, and even new windows and photovoltaic systems). The loans are secured by the ULI’s ability to oversee the utility savings and loan payments, as well as defining which residential energy upgrades are “tried and true” energy savers.

(This system mimics the mortgage industry’s Energy Improvement Mortgage program but without the hassle of renegotiating mortgage terms and closings costs.)

**Estimated greenhouse gas reduction to be achieved** – Average reduction in residential contribution to greenhouse gas emissions is 45%. The average home scores a 130 on the HERS Index. Homes built to 2004 International Energy Conservation Code (IECC) score 100 and are 30% more efficient than average homes. Even new construction homes could be improved to Energy Star levels of efficiency and score an 85 on the HERS Index.

### CASE STUDY

*1500 ft<sup>2</sup> Oakley, single family*

*\$27,812 for improvements wrapped into 30 yr mortgage*

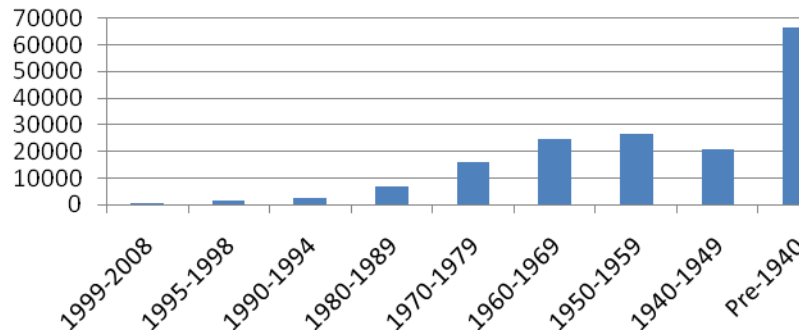
	Existing Home	Improved Home
<b>HERS Score</b>	225	69
<b>Mortgage</b>	\$1300	\$1477
<b>Utility</b>	\$284	\$85
<b>CO<sub>2</sub> Emissions</b>	12,445 lbs	3,111 lbs
<b>Cash Flow</b>	\$0	<b>\$264</b>

**CO<sub>2</sub> Emission Reduction:** 9,334 lbs/yr

**CO<sub>2</sub> Emission Reduction:** ~66,000 households were built pre-1940 and could save 75%

Climate Protection Energy Task Team – “Green Loan” Home Financing (continued)

### Cincinnati Houses by Age



The average household in Cincinnati produces approximately 12 tons of CO<sub>2</sub> per year. Assuming a green loan program will stimulate .5% of households to adopt home energy upgrades that cut emissions in half, then GHG would be reduced by 4,500 tons per year. [6 tons x 750 (.5% of households)] 18,000 by 2012, 90,000 tons by 2028.

**Implementation responsibilities/assignments** – Duke Energy Co., in cooperation with the City, one or more financial institutions, and one or more energy efficiency contractors. This program naturally fits well within the existing utility companies’ infrastructure and their diversified investment portfolio. It is in Duke’s interest to provide the energy efficiency loan before someone else does.

- 1) Lender must define “tried and true” energy upgrades approved for loans or else rely on a HERS rating (or equivalent)
- 2) Lender must define terms of loans.
- 3) Lender must have significant cash flow to offer loans and secure itself against default.
- 4) Contractors/suppliers must guarantee work is to specification so energy savings will be realized.

**Cost to implement/net savings from implementation-** \$0 cost, because the paybacks of the improvements match the terms of the loans, there is merely a reallocation of dollars already being spent to run our inefficient homes. Cash flow only improves as energy prices increase.

**Multiple benefits anticipated (in addition to greenhouse gas reductions)** – Since there are only one dozen items that are defined as “tried and true energy savers” (whose utility savings payback periods match the terms of the loans), no loans are given to people who can’t pay them back. Monthly utility savings are guaranteed to be greater than monthly loan payments—cash flow improves. All savings grow at the rate of energy prices. Property values go up \$20 for every \$1 reduction in the home’s annual utility expenses. Home comfort and home health improve. Jobs are created in the field of residential energy infrastructure, including, conservation, efficiency, and renewable. Loans get more secure as energy prices rise. Homeland security increases due to greater energy independence and price stabilization.

**Timeline for implementation** – Approval should look very much like Hamilton County Home Improvement Loan with the additional time it takes to aggregate utility customers through the ULI. (Ask Cadence for partnership to create a residential version of their service), or ask Duke or other smaller utilities.

## Climate Protection Energy Task Team Photovoltaic Energy

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 1A-9

Recommendation: Renewable Energy using Solar Photovoltaic Electric for Use in the Residential, Commercial and Institutional Sectors

<b>Estimated Annual GHG Reduction</b>	<b>500 tons in 2012; 198,326 tons in 2028</b>
	<b><u>City Government 50 tons in 2012; 10,000 tons in 2028</u></b>

**Summary of specific issues** – In Cincinnati a considerable amount of electricity is used by residents and businesses which is mostly generated by coal. A significant amount of GHG can be reduced over the next 20 years by utilizing Grid-Tied Solar Photovoltaic Technologies. This technology affords a reasonable payback, which is anticipated to improve over time, while producing electricity without the use of fossil fuel. Depending on house size, load usage, conservation measures taken, Southerly orientation towards the sun, shading, roof size and budget; will ultimately determine the size of the system required. The expected life of the system is 25-50 years. This technology has a proven track record of success for well over 30 years, and continues to improve in efficiency and cost.

**Strategy/action plan** – Educate the home owners, businesses and institutions of Cincinnati on how to utilize this long proven technology, as well as financial incentives, rebates and tax credits currently available. In addition, as an incentive, the City of Cincinnati should consider a small property tax credit or subsidy to aid the Residential/Commercial/Institutional organizations in financing PV systems. This action would demonstrate a strong Idealistic and Financial commitment by City Officials.

#### Estimated greenhouse gas reduction to be achieved –

For a commercial/institutional 22 kW PV system:

**Estimated Utility Savings:** \$3,500-\$4,500 per year

#### Environmental Impact / Pollution Avoided Over 25 Years:

45,221 lbs. CO <sub>2</sub> / 1 kW = 994,862 lbs	131 lbs. SO <sub>2</sub> / 1 kW = 2,882 lbs
145 lbs. NO <sub>x</sub> / 1 kW = 3,190 lbs	8.9 lbs. particulates / 1 kW = 195.8 lbs

#### Estimated greenhouse gas reduction to be achieved –

For a Residential 4.4 kW PV system:

**Estimated Annual Utility Savings:** \$700-\$900 per year

#### Environmental Impact / Pollution Avoided Over 25 Years:

45,221 lbs. CO <sub>2</sub> / 1 kW = 198,972.4 lbs	131 lbs. SO <sub>2</sub> / 1 kW = 576.4 lbs
145 lbs. NO <sub>x</sub> / 1 kW = 638 lbs	8.9 lbs. particulates / 1 kW = 39.16 lbs

**Implementation responsibilities/assignments** – Promotion of Photovoltaic Systems will be accomplished by a team led by Green Energy Ohio (GEO) and including the City's OEQ, Cincinnati State, University of Cincinnati, and private solar energy companies. GEO is a non-profit organization that is currently leading solar implementation efforts in the Cincinnati region.

Climate Protection Energy Task Team - Photovoltaic Energy (continued)**Cost to implement/net savings from implementation –**

- Residential Savings pay back the cost of the system in 15-20 years with present rebates and tax incentives.
- Commercial savings pay back the system in 5-10 years with present rebates and tax incentives.
- Asset value increase to real property is 20 times the first year utility savings.
- Ohio exempts photovoltaic equipment from property taxation, the state's sales and use tax, and the states franchise tax where applicable. <http://www.odod.state.oh.us/cdd/oe/elfgrant.htm>.

**Multiple benefits anticipated (in addition to greenhouse gas reductions) –** The financial picture is bright using this time tested technology towards a sustainable and renewable future. No carbon footprint, not to mention the increase in property value and the knowledge that the power of the sun rewards us with 100% pollution free electricity which through Net-Metering over production of power can be sold back to the utility company.

**Timeline for implementation –**

Pilot Scale implementation will take place over the next 5 years, anticipated to be about 100 kw of new installation per year. As PV economics improve, the pace of installations should increase significantly, with a goal of 20% penetration in 20 years, in both residential and commercial sectors.

**Impact:**

500 tons by 2012.

132,880 tons residential by 2028 (151,000 residences x .2 implementation rate x 4.4 kw per system x 1 ton/kw/year).

65,446 tons commercial by 2028 (14,874 businesses x .2 implementation rate x 22 kw per system x 1 ton/kw/year).

## Climate Protection Energy Task Team Solar Thermal Residential

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 1A-10

Renewable Energy using Solar Thermal Hot Water Collectors for use in the Residential Sector

#### Estimated Annual GHG Reduction

**11,476 tons in 2012; 57,380 tons in 2028**

**Summary of specific issues** – In Cincinnati a considerable amount of hot water is used for cooking, cleaning, bathing, and heating by its residents and is generated by natural gas, propane or electricity. A significant amount of GHG can be reduced by utilizing hybrid solar thermal technologies. This technology affords a rapid payback while producing domestic hot water and radiant heat by using a small percentage of fossil fuels. House size, number of persons in the residence, and budget will ultimately determine the size of the system required. The expected life of the system is 20-25 years. Solar thermal is currently the most cost effective renewable energy supply available in the marketplace.

**Strategy/action plan** – Educate the residents of Cincinnati on how to utilize these long proven technologies, as well as existing financial incentives, rebates and tax credits. In addition, as an incentive the City of Cincinnati should consider a small property tax credit or subsidy to aid the homeowner in financing a solar thermal system.

State of Ohio: Residential solar-thermal systems are eligible for a grant of \$30 per kilo-Btu per day or 50% of the project's cost, whichever is less. The maximum grant award for a solar-thermal energy system is \$25,000. The maximum grant award per residence is \$25,000, regardless of how many eligible systems are installed.

Ohio exempts solar thermal equipment from property taxation, the state's sales and use tax, and the state's franchise tax where applicable. <http://www.odod.state.oh.us/cdd/oe/elfgrant.htm>

**Estimated greenhouse gas reduction to be achieved** – For the CO<sub>2</sub> values listed, see the Solar Usage Now Website <http://www.findsolar.com/oemestimator/index.php>

#### **Based on a family of four persons using 80 gallon per day hot water:**

Energy Produced by Solar Water Heater: 2,290kWh/year electric

Natural Gas Saved by Solar Water Heater: 2,290 kWh/year electric

GHG savings would be 1.9 tons/year per household. If 1% of households adopt this technology each year, starting in 2009, the CO<sub>2</sub> savings would be 11,476 tons in 2012 (151,000 households x 4 years x .01 rate per year x 1.9 tons per installation) and 57,380 tons in 2028 (151,000 x 20 x .01 x 1.9).

**Implementation responsibilities/assignments** – Promotion of Solar Thermal Systems will be accomplished by a team led by Green Energy Ohio (GEO) and including the City's OEQ, Cincinnati State, UC, and private solar energy companies. GEO is a non-profit organization that is currently leading solar implementation efforts in the Cincinnati region.

**Cost to implement/net savings from implementation** – System cost is approximately \$4,000. With a 50% subsidy, and a \$240 annual savings, the system would pay for itself in 8 years. Capital investment would be \$6.0 million/year (4,000 x 151,000 residents x .01 rate per year)



Climate Protection Energy Task Team - Solar Thermal Residential (continued)

**Multiple benefits anticipated (in addition to greenhouse gas reductions)** – Save money, save natural resources, improve air quality, produce local jobs.

**Timeline for implementation** – Promotional activities will start in 2008. Some installations are already occurring. The pace of installations will ramp up in 2008 and 2009.

## Climate Protection Energy Task Team Educational Outreach

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 1B-1

Increase educational efforts to expand public awareness of energy conservation methods and greenhouse gas emissions.

#### Estimated Annual GHG Reduction

N/A

**Summary of specific issues** – There are a number of ideas under the Energy Task Team’s recommendations that require a massive outreach to the public to make them possible to implement.

#### **Strategy/action plan –**

- Offer classes to the public in the new community learning centers at Cincinnati Public Schools. Increase education efforts in schools using current infrastructure such as Keep Cincinnati Beautiful <http://www.keepcincinnatibeautiful.org/> or the Young Professionals Kitchen Cabinet’s Health and Environment Committee <http://www.cincinnati-oh.gov/mayor/pages/-3048/>.
  - Emission reduction efforts
  - Renewable energy sources & different energy efficient systems
  - Low energy products
  - Energy awareness program-lower thermostat in winter, raise it in summer
  - Encourage green building techniques including green roofs, rain water capture & reuse, natural ventilation, passive solar
  - Educate public on the importance of installing Energy Star appliances
  - Government to make available free compact fluorescent bulbs to low income citizens
  - Educate people on sources of greenhouse gas
- Do mass yearly mailings to citizens of US Department of Energy’s “Energy Savers” booklet which offers countless tips to increase conservation in the home. [www.eere.energy.gov/consumer/tips/](http://www.eere.energy.gov/consumer/tips/).
- Distribute home efficiency kits similar to what Duke Energy is doing <http://www.duke-energy.com/ohio/savings/calculator.asp>. Modify kits to be more appropriate to renters in apartment buildings and target distribution to them.

**Estimated greenhouse gas reduction to be achieved** – N/A

#### **Implementation responsibilities/assignments –**

- Office of Environmental Quality
- Keep Cincinnati Beautiful
- Young Professionals Kitchen Cabinet’s Health and Environment Committee

**Cost to implement/net savings from implementation** – Additional funding would need to be allocated to the Office of Environmental Quality and Keep Cincinnati Beautiful. If funding was put in place in the 2009 budget, educational programs could begin that year.

Climate Protection Energy Task Team – Educational Outreach (continued)

**Multiple benefits anticipated (in addition to greenhouse gas reductions)** – Educating the public on the importance of reducing greenhouse gases and energy conservation is priceless. Energy conservation reduces resident’s energy bills and puts more money into the local economy.

**Timeline for implementation** – Late 2009 if funding is approved for the 2009 budget.

## Climate Protection Energy Task Team Contractor Training Program

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation #1B-2

Institute a training program partnering the local design community with regional governments to offer a comprehensive approach to home improvement that provides comfort, energy savings, and cost savings for homeowners.

#### Estimated Annual GHG Reduction

N/A

**Summary of specific issues** – Designers, contractors, and the general public are increasingly seeking information regarding green building strategies.

**Strategy/action plan** – The city of Boulder Colorado was the first municipality in the country to mandate a residential green code. The Boulder Office of Environmental Affairs supports the outreach and education of Boulder's Green Building and Green Points Program, which is a mandatory green building point system for all new residential construction seeking a building permit. The Boulder Office of Environmental Affairs sponsors workshops to increase building professionals' green building expertise and thereby encourage the use of cost-effective and sustainable building methods. Look for the Boulder Office of Environmental Affairs at the following link: [www.bouldercolorado.gov/](http://www.bouldercolorado.gov/)

Even though Cincinnati does not mandate green building strategies, this same program can be created in Cincinnati, modeled after Boulder. Through the Cincinnati Office of Environmental Quality, programs can be planned and sponsored with other green building organizations, including the local chapters of the American Institute of Architects - Committee on the Environment (AIA-COTE) and the United States Green Building Council (USGBC) who currently organize green building workshops and seminars.

Planning and sponsorship could also be shared by Hamilton County. With the help of the City and County, the number and quality of presenters could be expanded.

**Estimated greenhouse gas reduction to be achieved** – See other templates for lowering the GHG emissions of the local building stock.

**Implementation responsibilities/assignments** – Implementation will be accomplished by a team led by USGBC or AIA-COTE and including the city, county and private firm. The team will help organize, advertise, and expand the scope of existing programs. These organizations also team with the local chapters of the International Interior Design Association (IIDA), the American Society of Interior Designers (ASID), and the American Society of Landscape Architects (ASLA).

The programs could be expanded to include City of Cincinnati and Hamilton County. With the presence of representatives from these entities, it will bring news coverage and advertising.

**Cost to implement/net savings from implementation** –The program is currently funded by sponsors. Additional costs would be minimal to expand to include the City and County.

Climate Protection Energy Task Team – Contractor Training Program (continued)

**Multiple benefits anticipated (in addition to greenhouse gas reductions)** – The increased exposure will help educate designers, contractors, and the general public about green building and help make it a part of the general vocabulary of our community. Also, partnering between municipal and non-profit groups will be beneficial, not only for the seminars, but also for future projects that could use the City and County’s help in advertising the events.

**Timeline for implementation** – The program is already in place and it is conceivable that the partnering could be created in time for programs in 2008.

## Climate Protection Energy Task Team Cincinnati Conservation Corps

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 1B-3

Establish the Cincinnati Conservation Corps. The Mission of this organization is to "recruit, train, & support a network of volunteers who work together to improve the quality of life in our neighborhoods through environmental service projects that protect our water, clean our air, restore our land & save energy."

#### Estimated Annual GHG Reduction

N/A

**Summary of specific issues** – The Cincinnati Conservation Corps (CCC), a green conservation corps in Cincinnati modeled on a similar agency in Chicago (the Chicago Conservation Corps) would leverage the public interest in reducing GHG emissions, channeling that energy into civic participation into GHG and other conservation activities in the City of Cincinnati.

Economically the Cincinnati Conservation Corps would provide individuals with first hand experience working on GHG projects that they would be unlikely to receive on their own. The collective benefits of a green conservation volunteer corps include both reduction of GHG and further stimulation of economic growth, making some GHG projects less expensive and therefore collectively more are likely to be cost effective.

**Strategy/action plan** – Have OEQ send out a request for volunteers to the public through neighborhood community councils and other channels, have interested volunteers provide their contact information to the OEQ website. Charge the volunteer membership of (CCC) to elect a Board and establish by laws for operation.

**Estimated greenhouse gas reduction to be achieved** – quantifiable but currently unknown.

**Implementation responsibilities/assignments** – Office of Environmental Quality

**Cost to implement/net savings from implementation** – zero cost to implement; savings unknown.

**Multiple benefits anticipated (in addition to greenhouse gas reductions)** – The benefits of a green conservation volunteer corps are many and include:

- Increasing the rate of adoption of civic GHG strategies implemented by the Climate Change Commission while
- Providing regular opportunities for citizens to learn about GHG projects by rolling up their sleeves and participating on projects as volunteers

**Timeline for implementation** – The invitations for membership in the CCC should be mailed/communicated to the public immediately upon the adoption of the City of Cincinnati's Climate Action Plan.

## Climate Protection Energy Task Team Grant for Low Income

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 1C-1

Grants for low income specifically for energy efficiency improvements.

#### **Estimated Annual GHG Reduction**

**N/A**

**Summary of specific issues** – In addition to the social benefit of reducing carbon dioxide emissions, green building practices can have a very real personal benefit to residents. With a reduction in energy and water usage comes a reduction in utility bills, which provides very necessary savings for many families. This is especially true in low-income communities. Recognizing this issue, the City of Cleveland, in the 2008 RFP for its Housing Trust Fund, enacted a provision for the granting of up to \$100,000 for residential buildings of at least 20 units to be built to the LEED-Gold standard. The RFP also called for all housing units built with money from this fund to at least adhere to the Energy Star rating system. Cincinnati can emulate this program.

**Strategy/action plan** – Cincinnati can enact a similar program to Cleveland's through amendments to the provisions of the Community Housing Development Fund. The specific proposal is to require an energy star rating at a minimum on units constructed using loan money from this fund, and to provide additional money for projects attempting to achieve LEED certification.

To achieve this goal, it will be necessary to reach an agreement with the funding entities that provide resources for this fund. It will also be necessary to enact clawback provisions in the event a developer who chooses to take advantage of the LEED provision is acting in good faith to achieve certification. It may be possible to adapt accountability measures in place with the LEED tax abatement program in this instance.

#### **Estimated greenhouse gas reduction to be achieved** – N/A

**Implementation responsibilities/assignments** – The City of Cincinnati and the various banks which provide resources to the Community Housing Development Fund (CHDF) will have to agree on amendments to the fund's provisions. It will also be necessary to provide training to staff to ensure that there is a level of expertise related to green building techniques.

**Cost to implement/net savings from implementation** – Costs of this program will include staff time, as it will be necessary to include a qualified staff person who has expertise as a LEED-AP to ensure that proposals are feasible. Other costs include additional costs to the loan fund itself as developers take advantage of the LEED provision. However it should be noted that the original LEED tax abatement motion called for LEED costs to be an eligible use of CDBG funding. Therefore this proposal may provide relief on that end.

Climate Protection Energy Task Team – Grant for Low Income (continued)

**Multiple benefits anticipated (in addition to greenhouse gas reductions)** – This proposal will provide utility cost savings to residents of buildings which were financed in some form through the Community Housing Development Fund. Also, as is the case with other green building incentives, this will help drive the green building market, providing experience to designers and contractors, resulting in reduced green building costs over time.

**Timeline for implementation** – As it is already 2008, it is likely that the timetable for implementation of this program will be for funds released no earlier than 2010. This is assuming that the process is already underway for 2009.



## Climate Protection Energy Task Team Best Practices - Residential

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 1C- 2

Annual Mayor's Climate Change Best Practices Awards & Ceremony for a residential project.

#### Estimated Annual GHG Reduction

N/A

**Summary of specific issues** – A competition and awards ceremony would highlight to the general public the most financially successful projects to come out of this process. The winning entries in the competition would be homeowners who have reduced their GHG impacts while saving money.

In effect the competition, awards & informational website with the details of the competition and the entries that won would provide the average homeowner with a roadmap for undertaking a project in their home.

The benefits to the homeowner are financial; while the collective benefits include both reduction of GHG and economic growth.

It is important that we celebrate success if we are to be successful.

**Strategy/action plan** – Have the Mayor's office send out a press release announcing a date, time, & location for the awards competition dinner at Union Terminal, have the event catered and charge a modest fee to cover expenses. In the information provided make sure there is ample notice of the deadline for submissions and the details necessary for entering into the competition.

The awards ceremony should be televised and/or recorded for broadcast. A press advisory should be released after the event announcing the winners. Neighborhood councils should be included in the distribution.

**Estimated greenhouse gas reduction to be achieved** – N/A

**Implementation responsibilities/assignments** – Mayors Office; Environmental Advisory Council, Office of Environmental Quality

**Cost to implement/net savings from implementation** – zero cost to implement; savings unknown.

Multiple benefits anticipated (in addition to greenhouse gas reductions) – **The benefits of such an awards ceremony are many and include:**

- Increasing the rate of adoption of all GHG strategies implemented by the Climate Change Commission while
- Providing a yearly opportunity to reconvene all of the stakeholders to celebrate their success.

**Timeline for implementation** – The first awards ceremony should occur 1 year after the date of adoption of the City of Cincinnati's Climate Action Plan.

## Climate Protection Energy Task Team Amended LEED Tax Abatement

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 1C-3

Amend the Cincinnati LEED (Leadership in Energy and Environmental Design [www.usgbc.org](http://www.usgbc.org)) Tax Abatement Program to include an alternative rating system for residential renovation

#### Estimated Annual GHG Reduction

N/A

**Summary of specific issues** – Cincinnati passed a LEED tax abatement ordinance in 2007. This program called for tax incentives for the construction of new residential, commercial and industrial properties to the LEED standard. It also provided a tax incentive for a LEED certified residential renovation.

*However, at the time of passage, no feasible residential renovation LEED rating system existed.*

*Therefore, it is recommended that the City amend the LEED abatement ordinance to adopt a different rating system for residential renovation.*

**Strategy/action plan** – To amend the LEED abatement to include retrofits, three things must occur:

1. **Develop a reliable rating system to determine if a renovation is in fact “green.”** The Chicago Green Homes Program is suggested as a guide. Due to the similarity of the housing stock in these two cities, it is logical to adapt this program to Cincinnati’s needs. It is recommended that the City form a committee consisting of Community Development and Planning Staff, Building Department staff, a representative from the USGBC or AIA, and representatives from local urban developers to create this adapted rating system. It is important that whatever rating system the City adopts be as simple to understand as possible. While professional builders and development firms are taking leading roles in the rehabilitation of Cincinnati’s housing stock, there are many smaller companies or individuals who should also be encouraged to renovate green.
2. **Determine a cost and time-effective method for the City to verify that the rating system has been followed.** An advantage of obtaining LEED certification to receive a tax abatement is that it is a third-party verified process, and therefore, the abatement is granted upon receipt of certification documentation (in the case of residential construction). The authors of the LEED abatement felt, rightly so, that this simple method would be the most efficient. Therefore, it is recommended that a third-party verification tool be developed in this case as well. A suggestion would be to authorize a properly trained LEED rater to provide this verification.
3. **Determine the appropriate length and abatement valuation amount for a green renovation.** The LEED tax abatement ordinance currently calls for a 10 year tax abatement up to a valuation cap of \$500,000 on residential property renovated to a LEED Certified, Silver or Gold level, and a full abatement for property renovated to a LEED Platinum standard. For a renovation that is not LEED certified, the tax abatement is for 10 years up to a valuation cap of \$275,000. The incentive to build green is in the increased valuation cap. Once an appropriate green renovation rating system is developed, the City may choose to keep the valuation cap on the abatement at \$500,000, or may lower or raise the cap as it sees fit based on the difficulty of achieving certification. Note however that the time length of 10 years is the maximum allowed by state law for a renovation.

Climate Protection Energy Task Team - Amended LEED Tax Abatement (continued)

**Estimated greenhouse gas reduction to be achieved** – *Not immediately quantifiable.* The greenhouse gas reduction of a renovated residence is undetermined at this time. However, it will be possible to make that determination based on the strenuousness of the rating system adopted, an estimate of the participants in the program, and an analysis of the energy use of Cincinnati's existing housing stock.

**Implementation responsibilities/assignments** – The City of Cincinnati Department of Community Development, the City of Cincinnati Planning Department, and various community constituencies such as the USGBC will create a rating system and verification method. Cincinnati City Council must then adopt the amendments to the LEED ordinance.

**Cost to implement/net savings from implementation –**

- This program should have no significant initial costs during the development phase.
- It may be required to add specially 1 FTE position initially, with resources reassessed annually based on volume of applications (\$50,000).
- Net savings would be projected directly toward citizens who live in these renovated residences. Most studies on green building estimate savings of between 20% and 30% in utility costs. If these costs are projected over the total number of buildings that take advantage of this program, as well as over the lifetime of the project, these cost savings are significant.

**Multiple benefits anticipated (in addition to greenhouse gas reductions) –**

- These renovated structures will be more efficient. Reduction in the usage of utilities such as energy and water will lower greenhouse gas emissions in the City and will help to mitigate various water runoff issues.
- With a reduction in utility usage, bills will be lower for the residents of these buildings.
- Green buildings possess higher indoor air quality, which has the potential to lower healthcare costs
- Renovated housing stock raises property values. It also gives Cincinnati a marketing edge as a progressive "green" city.
- The Cincinnati building and development market will be able to utilize economies of scale, which have been proven to reduce green building premiums.
- Green renovation of existing housing stock has the ability to project the benefits of green building into low to moderate income communities.

**Timeline for implementation –**

- Development of an alternate residential renovation rating system: 6-9 months.
- Passage by City Council of ordinance amendment: 3 weeks.
- Effective date of ordinance: 1 month after passage by Council

## Climate Protection Energy Task Team Building Performance Disclosures

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 1C-4

Create building performance disclosures as part of real estate transactions to appropriately value “green” buildings, encouraging developers and sellers to invest in building upgrades and to receive appropriate return on investment.

#### Estimated Annual GHG Reduction

N/A

**Summary of specific issues** – Currently, green buildings are not promoted to their full value. It is left to the real estate agent to properly represent the green features. If the agent is not familiar with the value that green features bring to a building, then it is possible that the seller will not receive their proper return on investment.

Information is required for buyers to understand the houses they buy. Realtors discuss the individual strategies (furnace age, newer windows, Energy Star appliances) but do not discuss the overall performance of the house. A similar comparison would be trying to sell a car on its properly inflated tires and aerodynamic shape, but not discussing the overall performance rating of miles per gallon fuel efficiency. If a rating such as this were used to sell a house, it would describe in a simple manner, the overall performance of the house.

If an overall “building performance disclosure” was included on all real estate listings then not only would sellers receive their return on investment, but it would also encourage developers and sellers to invest in performance upgrades.

#### **Strategy/action plan –**

##### Team Building:

There would have to be team building at the local level between the real estate, green design, construction, and rating communities to require the addition of a “building performance disclosure” on all building listings.

##### Realtor Education:

It would be imperative that the real estate community be educated about green building strategies and rating systems. They would need to understand not only the value of the individual strategies, but also whole-house performance ratings. Local real estate companies could have several of their realtors become LEED accredited professional or the industry could create a “green” certification for realtors. There is a current certification from the organization Ecobroker, which trains realtors in green strategies. See [www.ecobroker.com](http://www.ecobroker.com).

##### New Homes:

Start with the MecCheck score which is submitted with each building permit. This system schematically measures the energy performance of the building. The system is in place, but is not third party verified and is prone to inaccurate information. The intent should be to move toward third party verified rating systems such as the HERS index developed by RESNET. The HERS index is recognized by Energy Star and several financial institutions that provide “green” mortgages and is third party verified. However, the HERS index only scores energy performance. A more inclusive scoring is the LEED program. LEED is

Climate Protection Energy Task Team - Building Performance Disclosures (continued)

third party verified. It is a point system that rates the building in terms of energy use, site design, water conservation, indoor air quality, and material use.

Each building would have a HERS score for the real estate listing if the Building Department required the more inclusive HERS rating over the simplified MecCheck.

Existing Homes:

A homeowner can pay to have a HERS rating completed on their house, with or without new construction. There is no LEED system in place to rate existing residential buildings, but there are other cities who have written their own system for remodeling and a system could be adopted for Cincinnati.

Listing:

The listing could be a comparison on a sliding scale similar to the Energy Star rating, placed with the house listing information. Homes could be compared by square footage and approximate age of the structure. For example a 2500 sf home would be rated against homes between 2000-5000 sf built within ten years of each other, and the sliding scale would show the house is in the 90<sup>th</sup> percentile.

**Estimated greenhouse gas reduction to be achieved** – The greenhouse gas reduction is not measurable within this template. Energy upgrades and greenhouse gas reductions would be calculated within another template discussing upgrading the existing housing stock.

Implementation responsibilities/assignments – **Implementation efforts should be led by the Home Builders Association and should include:**

Realtors – must lobby their own industry to make it standard to have a “building performance disclosure” on the listing. At first, it may be blank on most listing, but eventually it will become standard as competition grows.

Third Party Verification – more raters will be required to fill the need. Local colleges could offer classes for raters.

Local Green Building Organizations – groups such as USGBC, AIA-COTE, and NAHB need to help with education and also to lobby the real estate industry to promote the valuation of green building practices.

**Cost to implement/net savings from implementation** – There would be education costs for realtors who become certified in a green building program. Home owners would have to pay for third party testing, approx \$400-\$600/house for a typical HERS rating. But if a HERS index was required for building permits, this would be a standard fee for all projects, not an “extra” fee.

Climate Protection Energy Task Team - Building Performance Disclosures (continued)**Multiple benefits anticipated (in addition to greenhouse gas reductions) –**

A competitive system such as this would help promote green building strategies. There would be an appropriate return on investment for developers and homeowners who have invested in environmental upgrades. Using an agreed upon rating system would also help with mortgage institutions that offer “green” financing and communities with available grants and tax incentives. Also, an agreed upon rating system would help structure tours and homefests, further promoting green design. Finally, additional jobs would be created for HERS raters.

**Timeline for implementation** – The HERS and LEED systems are already in place. One green certification is already in place for realtors. Realtors could start the process as soon as possible. Market forces and competition would help speed up the industry to the point all buildings have a “building performance disclosure” listing.

## Climate Protection Energy Task Team State and Federal Policy Action\*

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 1C-5

The City of Cincinnati should develop qualified advocacy/legal/lobbying capabilities to ensure strong advocacy of State and Federal policies which enhance cost-effective greenhouse gas reduction strategies within the City. Specific actions include advocacy and support for the development of state level electric efficiency programs, such as those included in Substitute SB 221, and passage and implementation of similar legislation affecting natural gas efficiency programs.

\* This template was not part of the Task Team process. It was developed after completion of their work.

#### Estimated Annual GHG Reduction

#### Not Immediately Quantifiable

**Summary of specific issues** – Substitute SB 221 is the most immediate and clear example, and potentially one of the most powerful opportunities facing the City of Cincinnati. Fully implemented, it would achieve a 2% annual average net reduction in electricity consumption at about one third the cost of retail electricity, in 2019. It is by no means the only one where a strong advocacy role on the part of City government equipped with adequate understanding of the issues and opportunities can enhance economic development and reduce greenhouse gases far beyond most means available to the City on its own.

In the short term, it is attractive to think in terms of passage of the Illinois standard, which is the electric efficiency component of Substitute SB 221, requiring 2% of electric load to be met by new efficiency each year after a phase in period. Three states currently meet this standard and three others have a law in place. About ten other states are moving that way, and are presently above 1%.

The City of Cincinnati should plan to advocate and participate in the development of a 2% standard for electricity and natural gas, and to participate in the development of rules and programs to implement those standards. It should plan to advocate policies and legal changes to increase opportunities for Combined Heat and Power, which also could eliminate 15 – 30% of the City's electric CO<sub>2</sub> emissions at a fraction of the retail cost, and eliminate much larger rate increases from future power plant construction, if done on a large enough scale to reduce total system consumption of electric fuel.

Beyond these, many other areas exist where good quality advocacy by the City will make a great difference. Recognizing that resources are scarce, a single well informed spokesperson for the City would be a cost effective way of reducing GHG emissions.

Many other issues have climate impacts. Advocacy at the PUCO can help enhance opportunities for renewable energy by changing laws for payment of electricity generation. Others include transportation policy issues at State and Federal levels, sewer funding, labeling, enforcement of controls on non-greenhouse gas pollution, transportation policy and more.

The core statement of this recommendation is that a Climate Advocacy role should be identified as a specific task that the City of Cincinnati undertakes. Additionally, the Climate Protection Steering Team, in whatever final form it emerges, should have the direct responsibility to advise on central policy objectives for the Climate Advocacy function. The functional location is open for discussion but the Law Department seems appropriate.

Climate Protection Energy Task Team - State and Federal Policy Action (continued)

**Strategy/action plan** – The Climate Protection Project staff should survey the City government briefly with a summary statement about an advocacy role, and identify a possible structure and available resources based on existing political and intergovernmental relationships. The need for enhanced advocacy, including time and funding to increase the City’s internal expertise on efficiency and climate issues, available time, and sources of possible funding for the staffing needs should be explored and brought to the Climate Protection Steering Committee for recommendation to Council.

**Estimated greenhouse gas reduction to be achieved** – Not immediately quantifiable - Substitute SB 221, fully implemented, would achieve a 2% annual average net reduction in electricity consumption at about one third the cost of retail electricity, in 2019. Expanding these programs to natural gas, and increasing other statewide and Federal efficiency programs, appliance standards, building codes and similar measures will significantly enhance the total savings.

The electric efficiency measures in Substitute SB 221 will save approximately 30% of total electric expenditures by 2020, due to the avoidance of new power plant construction projects. The economic benefits of these efficiency programs are a much larger fraction of total future electric rates than the CO<sub>2</sub> reductions are of future electric emissions.

**Implementation responsibilities/assignments** – Under discussion.

**Cost to implement/net savings from implementation** – As written, this recommendation considers advocacy only for measures that save several times their cost. Utility efficiency programs include net present valuation tests in their cost-effectiveness determination before program approval, so there is an ongoing real world net economic benefit, tempered only by the potential to fail to do enough program actions to eliminate the next power plant.

Diversion of a small fraction of the existing capital investment stream, no more than three percent for HB 487 and no more than six or seven percent for the entire group of programs initially considered here, cause no increase in revenue requirements.

**Multiple benefits anticipated (in addition to greenhouse gas reductions)** – As described above, the efficiency program savings create significant economic benefits.

**Timeline for implementation** – An immediate opportunity exists for an advocacy role. The details of that opportunity depend entirely on when the role becomes available.



## Climate Protection Energy Task Team LEED Certification for the Banks Riverfront Development

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 2A-1

Identify the Banks as a showcase for sustainable community development. Host a colloquium for architects and engineers to make zero energy buildings; seek LEED (Leadership in Energy and Environmental Design) Certification for the Banks.

#### **Estimated Annual GHG Reduction**

**6,043 – 10,071 tons/year**

**Summary of specific issues** – The Banks development will be an approximate by 2,800,000 sf. Current development plans do not call for any specific goals as related to sustainability or energy efficiency. Based on a report issued by the Cincinnati Chapter of the USGBC (US Green Building Council), dated May, 2006, the combined heating, cooling, and lighting of all buildings included in the development will be responsible for producing approximately 20,142 tons of CO<sub>2</sub> annually. These are additional CO<sub>2</sub> emissions not counted in our baseline data.

**Strategy/action plan** – The City of Cincinnati should promote the adoption of LEED Certification as a goal for the Banks development. This can be supported by bringing local architects, engineers, and other organizations that have sustainable design expertise together with the development team to assist in developing appropriate energy efficiency and sustainable design goals for the Banks.

**Estimated greenhouse gas reduction to be achieved** – By utilizing the LEED rating system, which according to a recent USGBC study has been shown to reduce energy consumption by 30% on average, and up to 50% in specific cases, the reduction would range from 6,043 tons/yr to as much as 10,071 tons/yr.

**Implementation responsibilities/assignments** – The Office of the Mayor, City Council, and the City's representative on the Banks Working Group would be responsible for setting this as a priority and promoting adoption of LEED Certification goals.

**Cost to implement/net savings from implementation** – The direct financial cost to the City would be negligible, as the implementation for this strategy requires City Officials to provide public support for the Banks to seek LEED Certification. Costs to pursue LEED Certification to the development team are variable, but reports have shown that average construction costs increase only 2%, with many projects incurring no cost increases at all. In addition, the annual savings from 30% reduction in energy use could offset any up-front increases in cost.

**Multiple benefits anticipated (in addition to greenhouse gas reductions)** – By showcasing the Banks as a model for sustainable development, the City of Cincinnati would increase its' perception as a 'green' city. This would have many benefits including retention of young professionals, increased population growth, and a competitive advantage over other mid-west cities in attracting new 'green' businesses and residents.

Residents, tenants, and users of the buildings at the Banks will benefit from green building in multiple ways. Energy costs will be lower for tenants/owners, indoor air quality will be better, and studies have shown reduced incidents of illness, increased productivity, increased retail sales, and even increased recovery times from surgery and illness all linked to green buildings.

The citizens of Cincinnati would benefit through the educational opportunity of showcasing the Banks.

Climate Protection Energy Task Team - LEED Certification for the Banks Riverfront Development  
(continued)

When contractors, architects, engineers, developers, facility managers, owners, and tenants become more familiar with LEED and sustainable building strategies, the barriers commonly cited for not building green will diminish, and green building practices will become more common throughout the region, bringing with it the benefits listed above.

**Timeline for implementation** – Sustainable design strategies are most effective from an environmental and an economic perspective when incorporated as early as possible into the design and planning process. Current development timelines for the Banks indicate construction beginning in 2008, therefore this initiative should be acted upon immediately.

## Climate Protection Energy Task Team Cincinnati Public Schools Energy

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 2A-2

Encourage Cincinnati Public Schools to improve its energy efficiency.

#### Estimated Annual GHG Reduction

Not immediately quantifiable

**Summary of specific issues** –Cincinnati Public Schools operates many school buildings, an Education Center, and ancillary buildings all of which are candidates for careful energy management.

**Strategy/action plan**-The CPS Office of the Chief Operations Officer has issued a document entitled CPS Energy Conservation 2007-2008 School Year and related instructions mandating operating procedures related to school buildings including food service areas. Enforcement relies upon the school Principals, Building Managers, and routine inspections. In 2006, CPS established an Energy Conservation Task Force committed to LEED Silver certification for all new buildings, joined the Green Partnership for Greater Cincinnati, registered with Energy Star, and conducted an energy audit in every building which recorded temperatures by room and equipment and appliance throughout each building. Software was purchased in 2007 that will compare cost and usage with other similar buildings in the nation. Currently data is being entered into the system.

Public scrutiny and oversight will help ensure that energy conservation efforts maintain an appropriate level of prioritization throughout the CPS system.

**Estimated greenhouse reduction to be achieved**- To be determined.

**Implementation responsibilities/assignments** – Currently the responsibility for enforcement lies with building Principal, Building Manager and Food Service Manager. Responsibility is unknown in ancillary buildings. Performance based incentives or penalties would help promote conservation efforts.

**Cost to implement/net savings from implementation** –Unknown at this time

**Multiple benefits anticipated (in addition to greenhouse gas reductions)** –

- Reduction in energy costs
- Establishment of a culture of conservation throughout CPS

**Timeline for implementation** – Now in progress, but no date has been set for a definitive report.

## Climate Protection Energy Task Team Energy Savings for City Government

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 2A-3

Expand Mayor Mark Mallory's Green Cincinnati program.

#### Estimated Annual GHG Reduction

**11,651 tons in 2012; 30,293 in 2028**

**Summary of specific issues** – Expand Mayor Mark Mallory's Green Cincinnati program to be more aggressive with energy efficiency savings goals. In 2007 Mark Mallory set a 4% energy reduction in one year and 10% in 4 years for City buildings excluding utility city departments. To see if these goals were achievable, the One Stop Permit Center volunteered at the end of 2007 to see how much energy could be saved simply by altering employee habits (controllable energy use). The results were astounding with a reduction of energy use of 19%. The annualized energy savings equaled approximately 179 kWh per employee. If expanded to a City workforce of 6,200 employees, the projected operational savings would be in the range of \$74,400 - \$192,200 per year with a GHG reduction of 770 tons of CO<sub>2</sub>. (179 kWh x 6,200 = 1,110,000 kWh; 1,440kWh = 1 ton of CO<sub>2</sub>).

**Strategy/action plan** – Provide additional capital funding to Public Services, City Facility Management specifically targeted for energy conservation/ efficiency in existing City buildings to assist in achieving more aggressive energy conservation measures. Capital funding could be equal to operational savings from altering employee habits (controllable energy use) so there would be no additional costs to the City, approximately \$150,000/ year. Currently, there are no project funds for this work. Funding could be used for:

- Replacing T-12 light fixtures with T-8s or even T-5s
- Installing sensors in office spaces to automatically turn off when not in use
- Installing more efficient windows in buildings
- Additional insulation in buildings
- More efficient mechanical equipment
- Replacing exit signs with LED fixtures
- Installing timers/ photocells on exterior lighting to turn off between 12am and 6am.

The City should also consider passing an ordinance requiring City Departments to purchase ENERGY STAR equipment and appliances when applicable.

Finally, the City should systematically conduct energy audits for all of their buildings. This is currently underway at some facilities with the help of performance contractors, however, it is not mandated that departments need to follow through with recommendations or that each and every building be audited. Funding would need to be provided to various City agencies to allow them to conduct these audits

**Estimated greenhouse gas reduction to be achieved** – 11,651 tons in 2012; 432,000 tons x .31 (percent non-utility) x .87 (percent electric) x .10 (mayor's commitment). 30,293 tons in 2028 assuming 1%/year reductions from 2012 to 2028.

#### **Implementation responsibilities/assignments –**

- Office of Environmental Quality
- Public Services, City Facility Management
- Audits of buildings would need to be done by Department that actually owns the building.

Climate Protection Energy Task Team - Energy Savings for City Government (continued)

**Cost to implement/net savings from implementation** – Up front capital costs will be offset by yearly operational savings at facilities.

Initial cost – Energy retrofits to all City buildings are estimated to cost in the range of \$20 - 50 million dollars.

Source of Capital – Energy services performance contracts will be used to acquire 3<sup>rd</sup> party financing that does not count toward the City's debt limits, repaid from the energy savings from the financed projects.

Life Cycle Cost/Payback Period – State law limits ESPCs to projects that will pay for themselves in 10 years or less.

**Multiple benefits anticipated (in addition to greenhouse gas reductions)** – Having more efficient facilities will reduce costs of operations saving tax dollars.

**Timeline for implementation** – Additional capital funding could begin in 2009, projects specifically geared towards energy savings could start late 2009. Greater energy efficiency could then be recognized as soon as 2010.

## Climate Protection Energy Task Team High Solar Reflectance Roofs

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 2A-4

Encourage roofs with high Solar Reflectance Indexes (SRI)/ white roofs/ vegetated roofs similar to a Chicago Program already in place.

#### Estimated Annual GHG Reduction

Not Immediately Quantifiable

**Summary of specific issues** – The City of Chicago has two programs in place offering grants for Green Roofs (vegetated roofs) and Cool Roofs (roofs with a high solar reflective index SRI value, which are made with highly reflective or white material) to property owners. The benefit to these types of roofs is more efficient buildings, lower operating costs, reduction of the heat island effect within the City resulting in lowering the surrounding air temperatures. Green Roofs have the added benefit of reducing storm water runoff. In Chicago, the grant offered is based on the square footage of the roof, with a maximum grant of \$5,000-\$6,000.

[http://egov.cityofchicago.org/webportal/COCWebPortal/COC\\_ATTACH/CoolRoofsGrantsProgramDescription.pdf](http://egov.cityofchicago.org/webportal/COCWebPortal/COC_ATTACH/CoolRoofsGrantsProgramDescription.pdf)

**Strategy/action plan** – In Cincinnati, set up a similar program. Council would need to set aside a specific amount of money each year to fund the project and the funding would be available on a first come first serve basis to citizens. Community Development might be best suited to implement a grant program such as this.

**Estimated greenhouse gas reduction to be achieved** – Not Immediately Quantifiable

#### **Implementation responsibilities/assignments** –

- Office of Environmental Quality
- Community Development

**Cost to implement/net savings from implementation** – A good starting point for funding may be \$100,000/yr. Additional staffing may not be required because of the small scope of the program.

#### **Multiple benefits anticipated (in addition to greenhouse gas reductions)** –

- Save property owners money
- Extended life cycle of roof
- Reduced storm water runoff (for vegetated roofs)
- More efficient buildings
- Reduced heat island effect within the City

**Timeline for implementation** – Capital funding for this could be included in the 2009 budget.

## Climate Protection Energy Task Team More Efficient Street Lighting

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 2A-5

Department of Transportation: More efficient street lighting

#### **Estimated Annual GHG Reduction**

**2,440 tons in 2012; 13,824 tons in 2028**

The typical anti-light-pollution fixture reduces energy consumption ~40% from a comparable conventional fixture using the same light technology. These fixtures produce light that is directed towards the ground rather than scattered into the sky.

**Summary of specific issues** – DOT and the city have an ongoing replacement program that modernizes and upgrades street lighting. A useful link is the Dark Skies Association's list of approved products below, although most lighting supply houses are aware of this issue and have the ability to identify and deliver products. There are hundreds of configurations in every form relevant to Cincinnati's wide range of public and private lighting needs.

<http://www.nextrionet.com/mc/page.do?sitePageId=56423&orgId=idsa>

The following link discusses the lighting issues and quality of light, although it doesn't directly address street lighting issues. <http://data.nextrionet.com/site/idsa/is024.pdf>

This proposal would not alter normal maintenance programs, but would affect the products used, once the claims for safety and quality have been verified. The anti-light polluting products are expected to cost slightly more than conventional products, but energy savings will produce rapid payback. The primary reservation would be safety- and this issue requires further investigation. Other municipalities have adopted these so ample prior evidence exists for further evaluation. We hope that our recommendations would encourage them to proceed on their own to investigate and determine that this is a positive recommendation that fits prudent management.

**Strategy/action plan** – The proposal should be made to City and State officials and either the Duke representatives responsible for street lighting or the private contractors who manage street lighting for them.

**Estimated greenhouse gas reduction to be achieved** – Street lights account for 34,560 tons of CO<sub>2</sub> emissions/year. A 40% reduction over 17 years starting in 2010 would equal 2,440 tons in 2012 and 13,824 in 2028.

#### **Implementation responsibilities/assignments** –

- Environmental Advisory Council
- Office of Environmental Quality
- Department of Transportation and Engineering

**Cost to implement/net savings from implementation** – The City has already budgeted street light replacement in 2010. The incremental cost of installing the most efficient street lights will be small relative to the net savings. If there are budgetary hurdles, i.e. limits on the revenues available to the entities funding the ongoing replacement of street lighting which are not compensated by the realized savings in electric bills, these hurdles must be identified and addressed.

Climate Protection Energy Task Team - More Efficient Street Lighting (continued)**Multiple benefits anticipated (in addition to greenhouse gas reductions) –**

- reduced glare in the eyes of drivers, increased light on the roadway, improved safety
- reductions in criteria health pollutants, mineral exploitation, and resource depletion, mining and water table destruction
- economic benefits of energy savings
- improved visibility for astronomy, air travel and other related activities

While the City's municipal lighting is a valid target for anti-light-pollution lighting, there is a great deal of private lighting that can also benefit from this technology and produce the same benefits. The City's leadership will do as much as anything to encourage private entities to follow suit, given the economic and aesthetic benefits of this lighting.

**Timeline for implementation** – The City is scheduled to start a 17 year street light replacement cycle in 2010.



## Climate Protection Energy Task Team Bus Passes for City Employees

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 2A-6

Provide free public transportation via Metro and Tank passes for City of Cincinnati Employees

#### Estimated Annual GHG Reduction

**2163 tons in 2012**

**Summary of specific issues** – Vehicular emissions are a major contributor to greenhouse gas emissions in the United States. Promoting the use of public transportation could decrease vehicular emissions.

**Strategy/action plan** – City of Cincinnati employees would be offered free bus passes to encourage them to take public transportation rather than drive personal vehicles to work.

#### **Estimated greenhouse gas reduction to be achieved –**

##### Factors used in calculations

Number eligible employees: 6,000

Estimated percent participation: 25% (based on Duke Energy's experience with their program)

1 ton CO<sub>2</sub> generated per 104 gallons of gasoline consumed

Avg. vehicle mileage = 25 miles/gallon of gasoline

Miles per year = (15 miles/day) (5 days/week) (50 weeks/year) (1500 employees) = 5,625,000

Tons/year = (5,625,000 miles) (1 gallon/25 miles) (1 ton CO<sub>2</sub>/104 gallons) = 2,163 tons per year

#### **Implementation responsibilities/assignments** – City of Cincinnati Human Resources Department

#### **Cost to implement/net savings from implementation –**

##### Cost to City

\$9.00/month/employee (based on Duke Energy experience)

(\$9.00/employee/month) (1500 employees) (12 months) = \$162,000/year

##### Savings to employees

(5,625,000 miles) (.50/mile) = \$2,813,000/year

**Multiple benefits anticipated (in addition to greenhouse gas reductions)** – VOC and fine particulate emissions from vehicular traffic would also be decreased. Participating employees would decrease their driving and parking costs – it would be perceived by those who participate as a great benefit. May expose employees not familiar with public transport to the benefits – they may choose to take public transport during non-working hours. They may also become advocates with others for using public transit.

**Timeline for implementation** – The appropriate City employees should complete this section, if idea is approved. Funding should be included in the City's 2009 budget. Passes could be available in early 2009. Usage would ramp up over the first few years.

## Climate Protection Energy Task Team Commercial Building Code Upgrades

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 2A-7

Upgrade the energy code requirements for new Cincinnati commercial buildings through new city amendments to the Ohio Commercial/Energy Code.

#### Estimated Annual GHG Reduction

#### Not Immediately Quantifiable

**Summary of specific issues** – The heating, cooling, operating, and lighting of commercial buildings are responsible for nearly 1/3 of the energy use from existing local powerplants and natural gas usage. By raising the requirements of building energy efficiency, the draw on the local power plants and natural gas use will be lowered, therefore lowering the associated GHG emissions.

**Strategy/action plan** – The current energy code regulations for new buildings in Cincinnati are mandated at the state level. While Ohio meets the recommended National Model Energy Standard, Cincinnati could be a progressive model for the entire state and nation.

Many communities in the US strengthen the minimum state and national energy codes to increase the energy performance of buildings in their communities. Cincinnati could write their amendments to the Ohio energy code to go beyond ASHRAE 90.1-2004, similar to California and Vermont. The regulation should be written to customize the regulations to Cincinnati and Ohio's dependence on coal fired plants.

The goals for the energy reduction should be brave yet realistic. California and Vermont exceed the national standard and their guidelines should be reviewed to see how Cincinnati can do the same. This task team did not research other cities that have amended their states energy codes similar to this suggestion.

The City can work with the Department of Energy Codes Program to promote a stronger building energy code and can help them adopt, implement, and enforce those codes. Once the research is complete, the Cincinnati amendments could be a proven model for the rest of the state, hopefully for future state level adoption.

**Estimated greenhouse gas reduction to be achieved** – It is difficult to list the reduction in GHG emissions without knowing the exact level of energy code upgrades, but when Massachusetts adopted their new energy code in 2001, it was estimated to save approximately 13 percent of primary energy use for lighting and HVAC, and about 7.5 percent of all primary energy use in new commercial buildings. Cumulative new construction savings were projected at 14 trillion Btus between 2001 and 2021 and the present value of these projected savings is estimated to be about \$120 million.

The simple payback for all code requirements was expected to average less than two years. The reduced need for power generation offers a corresponding reduction in air pollution emissions. Over 20 years, the new code was expected to prevent 7,478 tons of sulfur dioxide, 2,003 tons of nitrous oxides, and 1.3 million tons of carbon dioxide emissions.

Climate Protection Energy Task Team - Commercial Building Code Upgrades (continued)

**Implementation responsibilities/assignments** - This task team is not familiar with the process of creating amendments to state codes. City officials would have a better understanding of the process. But based on the above mentioned Massachusetts state code revision, the following task team would be created:

- Create Energy Advisory Committee – consisting of Cincinnati permit officials, City Council representatives, Ohio energy code officials, local utilities representatives, representatives from the architectural, engineering, and construction industry, public stakeholders, and help from U.S. Department of Energy.
- The group would study impacts of suggested upgrades through research of other programs, energy modeling and cost analysis.

**Cost to implement/net savings from implementation** – Costs would be incurred during the Energy Advisory Committee study and report phase. It is difficult to forecast the costs, but the Department of Energy may have information regarding previous studies. Grants may be available from the Department of Energy, Building Energy Codes Program to help defray the costs for the activities of the Energy Advisory Committee.

Once the program is in place, the administration would be similar to the existing energy code permit process, requiring a minimal increase in personnel. Training for city officials would be beneficial.

**Multiple benefits anticipated (in addition to greenhouse gas reductions)** – Adopting and enforcing increased energy efficiency for commercial buildings may save society billions of dollars in operating costs. It can result in more durable and disaster-resistant construction. Occupants benefit from increased comfort, greater worker productivity and decreased absenteeism, improved air quality, and lower maintenance costs. The American Council for an Energy Efficient Economy (ACEEE) estimates the value of health and productivity improvements alone to be as much as \$170 billion per year.

Energy codes and standards for commercial buildings make U.S. businesses more competitive domestically and overseas by reducing utility expenses. Updating energy standards is a cost-effective policy option for communities. Each dollar spent on increased efficiency pays back many times to the consumer and the economy.

Specific to our region, there is a definite correlation in Cincinnati to energy production, air pollutant emissions, and our geographic idiosyncrasies that trap pollutants within the Ohio River valley, therefore increasing the frequency of smog alerts and elevating health concerns.

**Timeline for implementation** – This task team is not familiar with the process of creating amendments to state codes. City officials would have a better understanding of the process. But based on the above mentioned Massachusetts state code revision that took three years, a suggested timeline for a Cincinnati new building energy code amendment would be as follows:

- Create Energy Advisory Committee – months 1-4
- Study impacts through energy modeling and cost analysis – months 4-14
- Preliminary report – month 14
- Input from State level – months 14-16
- Revisions – months 16-23
- Final Report – month 23
- Approval by City Council – month 24

Climate Protection Energy Task Team - Commercial Building Code Upgrades (continued)

**References:**

U.S. Department of Energy

State Energy Alternatives

[http://www.eere.energy.gov/states/alternatives/codes\\_standards.cfm](http://www.eere.energy.gov/states/alternatives/codes_standards.cfm)

Building Energy Codes Program

<http://www.energycodes.gov/>

**Climate Protection Energy Task Team  
Photovoltaic Energy**

**TASK TEAM WORK GROUP RECOMMENDATIONS**

**Recommendation # 2A-8**

Renewable energy using Solar Photovoltaic Electric for use in the Residential, commercial and Institutional Sectors.

See Recommendation 1A-9

## Climate Protection Energy Task Team Energy Efficiency For Commercial/Industrial Buildings/Facilities\*

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 2A-9

Encourage the business sector (Commercial and Industrial) to implement energy efficiency measures for their buildings and facilities.

\* This template was not part of the Task Team process. It was developed after completion of their work.

<b><u>Estimated Annual GHG Reduction</u></b>	<b><u>47,700 tons of CO<sub>2</sub> per year or 190,000 in 2012 and 954,000 in 2028</u></b>
----------------------------------------------	-------------------------------------------------------------------------------------------------

**Summary of specific issues** – The energy consumption from business sector operations represent a sizable source of greenhouse gas emissions (GHG) and their resultant contribution to Global Climate Change. The Greenhouse Gas Inventory for the City of Cincinnati revealed that buildings and facilities in the Commercial and Industrial sectors accounted for approximately 55% of the total emissions tracked for the community, 40% from Commercial and 15% from Industrial.

Businesses are taking a new, strategic view of the global value of energy and its impact on their success. Energy consumption and the corresponding carbon footprint hold vast financial implications. Efficiency measures ranging in degree from utilizing a combined heat and power strategy to simpler green building measures, like CFLs and sensors, offer potential for reducing both GHG impacts and costs. (Additional measures like waste minimization and transportation efficiency strategies are critical as well, but are located in other sections of the Climate Protection Action Plan.)

**Strategy/action plan** – Best Practices and other resources are available to assist business in the pursuit of efficiency. Examples of two include the ENERGY STAR guidelines, the US Environmental Protection Agency's highly detailed process for energy management and reduction. (See their website at [http://www.energystar.gov/index.cfm?c=business.bus\\_index](http://www.energystar.gov/index.cfm?c=business.bus_index))

Performance contractors offer another approach for achieving reductions for organizations that prefer outsourcing or are resource challenged. These firms perform all analysis, make and implement recommendations and fund them via the energy cost savings achieved. Whatever the approach employed, the results are often both good for the environment and the bottom line.

**Estimated greenhouse gas reduction to be achieved** – Based on the emissions in the Inventory, if all businesses in the Cincinnati jurisdiction undertake programs that reduced energy consumption in their facilities of 1% per year, this action yields a 47,700 tons of CO<sub>2</sub> eliminated per year or 190,000 by 2012. A more likely scenario is that a smaller number of early adopters will reduce their consumption at a much greater level, like 5 – 10% or better.

**Implementation responsibilities/assignments** – The USA Regional Chamber, as the liaison to the business community, would be the champion in the development of this program. The corporate major players like GE, Kroger, P&G, etc. through participation and promotion could lead the effort by example. The Building Owners and Managers Association (BOMA) at <http://www.boma.org/AboutBOMA/7pointchallenge/> and other business organizations can also play key roles with their members.

**Cost to implement/net savings from implementation** – TBD

Climate Protection Energy Task Team – Energy Efficiency for Commercial/Industrial Buildings/Facilities\* (continued)

**Multiple benefits anticipated (in addition to greenhouse gas reductions) –**

- Potential cost saving improvements to bottom lines
- Health and wellness improvements from reduced pollution

**Timeline for implementation –**

Align participants – 3<sup>rd</sup> Quarter 08

Develop analysis/project plan – end of 08

Create marketing program – 2<sup>nd</sup> Quarter 09

Implement – mid 09

## Climate Protection Energy Task Team Upgrade Web Site

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 2B-1

Upgrade the City of Cincinnati's web site to make green initiatives/programs more obvious

#### Estimated Annual GHG Reduction

N/A

**Summary of specific issues** – Information on the City of Cincinnati's web site regarding green initiatives and accomplishments are barely offered and requires doing a search on the website to find it. This information needs to be readily available to citizens if Cincinnati wishes to green its population. This can be used as a marketing tool to attract/ retain green industry. Existing State & Federal programs with links which are applicable to our citizens should be readily available along with Cincinnati's accomplishments and goals for environmental change.

**Strategy/action plan-** On the home page, provide an obvious link to a "green initiatives" page. This page should list all of Cincinnati's green programs and accomplishments as well as any ordinances and environmentally geared incentives. The web site should also include Federal and State programs already in place such as:

1. Federal Weatherization Assistance Program  
<http://www.eere.energy.gov/weatherization/about.html>  
 <<https://myemail.cincinnati.state.edu/exchweb/bin/redir.asp?URL=http://www.eere.energy.gov/weatherization/about.html>> This program is managed by the State of Ohio  
<http://www.odod.state.oh.us/cdd/ocs/heap.htm> and has been actively funded for over 30 years. This program offers home improvements for energy savings to low income Americans.
2. Additional Federal tax incentives at <http://www.energytaxincentives.org/>.
3. State of Ohio: Ohio Energy Office <http://www.odod.state.oh.us/cdd/oe/default.htm> The Ohio Business Energy Resource Center provides tips, tools, and resources to manage energy for short-term savings and long-term energy solutions. The Ohio Small Business Energy Saver is free and easy for businesses spending less than \$150,000 yearly on energy to find ways to reduce energy waste.
  - a. Ohio Energy office offers grants and loans at <http://www.odod.state.oh.us/cdd/oe/GrantsLoans.htm> for businesses to encourage alternative fuel sites. The Energy Loan Fund Low-interest Loan Program is a low-interest loan program to incentivize advanced energy projects undertaken by commercial, industrial and some institutional entities in the service areas of Ohio's investor-owned electric distribution companies. Lastly the Advanced Energy Program has funding available through Distributed Energy Resources Projects (NOFA 07-01), Non-residential Renewable Energy (NOFA 07-02), Residential Renewable Energy (NOFA 07-03), Manufacturing Facilities' Energy Efficiency (NOFA 07-04), & Alternative Fuels Transportation Grant Program (NOFA 08-03).

Other information which should be included on Cincinnati's web site for citizen's to use is an online "carbon footprint calculator". Along with this calculator, the city should list several strategies to reduce their carbon footprint.

**Estimated greenhouse gas reduction to be achieved** – N/A



Climate Protection Energy Task Team - Upgrade Web Site (continued)**Implementation responsibilities/assignments –**

- City of Cincinnati's Regional Computer Center
- Office of Environmental Quality.

**Cost to implement/net savings from implementation –** Unknown. Some staff time to have web pages modified and added.

**Multiple benefits anticipated (in addition to greenhouse gas reductions) –**

- Education of citizens
- Marketing tool to draw people to Cincinnati
- Attract green industry to Cincinnati

**Timeline for implementation –** Immediately.

## Climate Protection Energy Task Team Easy Read Electric Meters

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation: 2B-2

Create electric meters that are easier to read.

#### Estimated Annual GHG Reduction

#### Not Immediately Quantifiable

**Summary of specific issues** – In Cincinnati a significant amount of the electricity used by residents is coal generated. A significant amount of GHG can be reduced by minimizing discretionary residential use of electricity. Modification of the meters is a tool to aid consumers, providing information about their electric and gas purchases.

**Strategy/action plan** – Work with Duke to dollarize residential gas and electric meters that conveniently display both \$ to date as well as the current \$/minute usage so that the occupants can have economically quantified cause and effect feedback to curtail consumption.

**Estimated greenhouse gas reduction to be achieved** – Not Immediately Quantifiable. Estimated GHG reductions from implementing this action item are stated below. The ICLEI Personal CO<sub>2</sub> calculator was used for the CO<sub>2</sub> values listed: [link:www3.iclei.org/co2/co2calc.htm](http://link:www3.iclei.org/co2/co2calc.htm)

These calculations are based on a 15% reduction in electric consumption and 10% reduction in gas consumption for a 900 sq ft apartment using gas furnace w/central A/C, electric clothes dryer, electric stove. All other parameters set to 0.

Baseline Time Frame:	1/2007 to 12/2007
Electric Use:	4900 kWh
Gas use:	710.5CCF
<b>CO<sub>2</sub> Emissions:</b>	<b>177,371 lbs or 88.69 Tons</b>

Reduce electric 15% reduce gas 10%

**CO<sub>2</sub> Emissions:** **159,357 lbs or 79.68 Tons**

CO<sub>2</sub> Emission Reduction 9.01 Tons for one 2-person household. Number of households TBD.

Money saved \$182 / yr

#### **Implementation responsibilities/assignments –**

- Duke Energy
- City of Cincinnati- Office of Environmental Quality

**Cost to implement/net savings from implementation** – Not Immediately Quantifiable

**Multiple benefits anticipated (in addition to greenhouse gas reductions)** – Lower utility bills provide additional income to residents.

**Timeline for implementation** – Duke would need to do a feasibility analysis to determine if meters can be modified and the cost for this adaptation.

**Climate Protection Energy Task Team  
CFLs For Kids**

**TASK TEAM WORK GROUP RECOMMENDATIONS**

**Recommendation # 2B-3**

Encourage CPS and other non-profit organizations to fund raise using sustainable products.

**Estimated Annual GHG Reduction**

**Not immediately quantifiable**

**Summary of specific issues** – Educate the residents of Cincinnati on the simple, low/no cost ways to reduce the energy consumption (electric, gas) and how to be more sustainable with everyday life.

**Strategy/action plan** – Encourage Cincinnati Public Schools and other non-profit organizations to fund raise for the children by selling products that are sustainable or low energy. By doing this, they will be educating the parents and potential buyers of the long term and short term savings in energy costs. These conservation and sustainable products would save residents money, generate local business and manufacturing, stimulating the regional economy. These energy reducing products would also provide income to students and their families that are participating in the fundraiser drives. Products such as educational/ how to books, CFL bulbs, water filters, water bottles, weatherizing sealers, thermal plastics, compost bins, & indoor/outdoor gardening supplies might be considered.

**Estimated greenhouse gas reduction to be achieved** – Not immediately quantifiable

**Implementation responsibilities/assignments –**

- **Cincinnati Public Schools**

**Cost to implement/net savings from implementation** – This project would be a fund raiser for CPS or another non-profit. The items sold would pay for themselves in energy savings in less than 1 year.,

**Multiple benefits anticipated (in addition to greenhouse gas reductions) –**

These conservation and sustainable products would:

- Save residents money
- Generate local business and manufacturing stimulating the regional economy
- Provide income to students and their families that are participating in the fundraiser drives

**Timeline for implementation** – To be determined.

## Climate Protection Energy Task Team Green For All Work Force

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### **Recommendation: 2B-4**

Educating and building a Green Work Force in Cincinnati.

#### **Estimated Annual GHG Reduction**

**Not immediately quantifiable**

**Summary of specific issues** – In Cincinnati there is an issue of overcrowded jails. The main reason for imprisonment is a lack of education and poverty. Another issue is a lack of trained individuals that can work in the green job market as it grows rapidly and requires a large work force to meet the demand.

**Strategy/action plan** – The resolution will be modeled on the New York program called Green For All. The theme is Green jobs for prisoners and other economically disadvantaged people. Our goal is to educate offenders and others so that they may become part of the green jobs work force and start an independent, crime-free life. This would help solve the issue of overcrowded prisons in Cincinnati. Through a mentored process of education, job training, job placement, and a weaning of the institutional way of life, these individuals will be able to create a new slate for themselves. Program participation involves a screening process where strict criteria must be met to be accepted. These individuals would gain the self-esteem and education that will allow them to start on a new path and help our region and state to build its workforce in the new green economy.

**Estimated greenhouse gas reduction to be achieved** –Greenhouse gas reductions are not measurable at this time, but other proposals in this report will rely upon the availability of skilled workers.

**Implementation responsibilities/assignments** – Implementation should be led by the Department of Community Development. The initiative in New York is headed by Van Jones. They will send a specialized team to work with Cincinnati and help develop a strategy for the region and potentially the entire State. The program could be patterned locally after the Brownfields job training program.

**Cost to implement/net savings from implementation** – The costs would consist of man hours involved and tools needed to facilitate the training. Most of the educational tools are inexpensive but could range to \$5k per participant. The savings would come from the avoidance of incarceration. Those rehabilitated could help build our regional economy.

**Multiple benefits anticipated (in addition to greenhouse gas reductions)** – The fiscal benefits from a green economy could have a big impact on the local economy.. As energy usage decreases regionally and businesses and households become more sustainable, our cash flow will increase dramatically across the board.

**Timeline for implementation** – 2008

## Climate Protection Energy Task Team Best Practices - Business

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 2C-1

Annual Mayor's Climate Change Best Practices Awards & Ceremony for best return on investment for implementing green ideas for a business project.

#### **Estimated Annual GHG Reduction**

**Not immediately quantifiable**

**Summary of specific issues** – A competition & awards ceremony would highlight to the general public the most financially successful projects to come out of this process. The winning entries in the competition would be businesses that have reduced their GHG impacts while saving their companies money, thus increasing their bottom line.

To promote the competition information could be posted to a website describing the details of the competition, and the winning entries. This could serve as an educational tool providing the average individual with a demonstration site for energy reduction and cost saving measures from GHG reduction activities.

The benefits to business are financial; while the collective benefits include both reduction of GHG and economic growth.

It is important that we celebrate success if we are to be successful.

**Strategy/action plan** – Send out a press release announcing a date, time, & location for the awards competition dinner.

The awards ceremony should be televised and/or recorded for broadcast and/or distribution of a press release after the event announcing the winners, should be sent to all businesses in the city.

**Estimated greenhouse gas reduction to be achieved** – Not immediately quantifiable.

**Implementation responsibilities/assignments** – Mayors Office; Environmental Advisory Council, Office of Environmental Quality

**Cost to implement/net savings from implementation** – zero cost to implement; savings unknown.

**Multiple benefits anticipated (in addition to greenhouse gas reductions)** – The benefits of such an awards ceremony are many and include:

- Increasing the rate of adoption of all GHG strategies implemented by the Climate Change Commission while
- Providing a yearly opportunity to reconvene all of the stakeholders to celebrate their success.

**Timeline for implementation** – The first awards ceremony should occur 1 year after the date of adoption of the City of Cincinnati's Climate Action Plan.

## Climate Protection Energy Task Team Right of Way Utility and Street work Coordination

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 2C-2

Do a better job of coordinating utility cuts and street rehabilitation (new asphalt); where possible transform asphalt medians to green medians.

#### Estimated Annual GHG Reduction

Not immediately quantifiable

**Summary of specific issues** –The city of Cincinnati has multiple public agencies and utilities that work in the right-of-way; among them are MSD, GCWW, Duke Energy, Cincinnati Bell, and the city’s Department of Transportation and Engineering (DOTE). Coordination of work in the right of way between these agencies occurs in early stages of design, through DOTE’s Infrastructure Coordinating Committee (ICC), where efforts can be maximized; however, many projects in the planning stage are not included in ICC meetings until they are actually in design.

The cost to perform this coordination is minimal with personnel from these agencies already on staff. Cost savings can be realized by avoiding design rework, construction inefficiencies, inconvenience to the public and waste by limiting the number of times a street is torn up for repairs.

In addition, DOTE and MSD must work hand-in-hand on every project possible to reduce non-porous surface pavement and replace it with green infrastructure.

**Strategy/action plan** – Each agency has designated a main contact person (and a back-up) with an understanding of the work in design, who meets quarterly with the ICC to identify potential projects where collaboration can occur. Additionally, every project manager should receive training in the importance of early design collaboration. Specific communication should occur about every project with every potentially impacted agency/utility. A willingness to coordinate and adjust schedules is needed to provide the maximum benefit to the public at the lowest possible cost.

Each transportation project in DOTE, from street rehabilitation to streetscapes, should have a checklist review to highlight potential areas for green infrastructure and coordination with MSD to achieve mutual benefits.

**Estimated greenhouse gas reduction to be achieved** –Not immediately quantifiable.

**Implementation responsibilities/assignments** – All utility and public agencies that work in the right of way would require the lead agency’s project manager to initiate coordination with the others.

- City of Cincinnati Department of Transportation and Engineering
- Metropolitan Sewer District (MSD)
- GCWW
- Duke Energy
- Cincinnati Bell
- Time Warner Cable

**Cost to implement/net savings from implementation** – Not immediately quantifiable.

Climate Protection Energy Task Team - Right of Way Utility and Street work Coordination (continued)

**Multiple benefits anticipated (in addition to greenhouse gas reductions)** – Fewer disruptions to the traveling public and businesses impacted by potential interruptions.

- Reduction of design re-work
- Reduction of costly infrastructure repair and replacement, which generally involves multiple applications of asphalt pavement; construction efficiency
- Reduction of storm water entering into the sewer system
- Reduction of the heat island effect
- Reintroduction of native plants and grasses in the urban fabric

**Timeline for implementation** –With the Infrastructure Coordinating Committee already in place, and contact persons and project managers identified, nothing is holding up this heightened level of coordination but an acceptance by all parties of its urgency.

**Climate Protection Energy Task Team**  
**No to low Volatile Organic Compound (VOC) coatings**

**TASK TEAM WORK GROUP RECOMMENDATIONS**

**Recommendation #2C-3**

The City of Cincinnati should pass an Ordinance requiring all City funded paint/coating jobs to use low or zero VOC coatings.

**Estimated Annual GHG Reduction**

**Not Immediately Quantifiable**

**Summary of specific issues** – Volatile Organic Compounds, or VOC's, are chemical compounds commonly used in paints, sealants, adhesives, and other similar coatings. VOC's are categorized by the characteristic of vaporizing (becoming gas) and being released to interior spaces and the atmosphere at normal room temperatures. "New Car Smell", "New Paint Smell", and "New Carpet Smell" are all caused by the release of VOCs. VOC's contribute to air pollution causing smog, many are categorized as greenhouse gasses themselves, and they also contribute to poor indoor air quality leading to respiratory disease. VOC's are suspected carcinogens. They are also known to combine in the atmosphere with other VOC gases to create new compounds, the effects of which are unknown.

**Strategy/action plan** – The City of Cincinnati should pass an ordinance requiring all City funded painting/coating projects to use Zero or low VOC paints, coatings, and primers. The "Low VOC" threshold should be established by an industry standard such as the 'Green Seal Standard' because acceptable VOC levels vary according to the application. The Ordinance could be revised in future sessions to broaden the scope to include low VOC adhesives, sealants, carpets, and furniture systems.

**Estimated greenhouse gas reduction to be achieved** – Average VOC content for paints and coatings varies between 90g/L upwards to 400g/L or higher. Actual reductions would depend on how frequently the City paints it's property, and what coatings would be used as an alternative.

**Implementation responsibilities/assignments** – Finance Department Purchasing Division and Department of Public Services

**Cost to implement/net savings from implementation** – The cost of Zero or Low VOC paints and coatings can be slightly higher, but does not vary significantly from average costs for high quality paints. All major paint manufacturers produce zero or low VOC versions of their products like Sherwin Williams, and Benjamin Moore, who claim that the low VOC products also perform better than the higher VOC products.

**Multiple benefits anticipated (in addition to greenhouse gas reductions)** – In addition to eliminating one source of GHG, indoor air quality will improve, painting can be scheduled during occupied hours saving money on after-hours work, and it will eliminate smog contributing chemicals from City projects. Use of low/Zero VOC products contributes to achieving points in the LEED rating system.

**Timeline for implementation** – *Immediate implementation for paints, implementation for other products could be done immediately or phased on an annual basis.*



## Climate Protection Energy Task Team Best Practices - Government

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 2C-4

Annual Mayor's Climate Change Best Practices Awards & Ceremony for best return on investment for a MUNICIPAL project.

#### **Estimated Annual GHG Reduction**

**Quantifiable but currently unknown.**

**Summary of specific issues** – A competition & awards ceremony would highlight to the general public the most financially successful projects to come out of this process. The winning entries in the competition would be civil servants who have reduced their GHG impacts while saving the city and their departments money.

In effect the competition, awards & informational website with the details of the competition and the entries that won would provide other municipal employees with ideas for reducing energy costs and corresponding GHG from those activities.

The benefits to the City of Cincinnati or other municipal government are financial; while the collective benefits include both reduction of GHG and economic growth.

It is important that we celebrate success if we are to be successful.

**Strategy/action plan** – Send out a press release announcing a date, time, & location for the awards competition dinner.

The awards ceremony should be televised and/or recorded for broadcast and/or distribution. A separate press release should be sent after the event announcing the winners to all city employees.

**Estimated greenhouse gas reduction to be achieved** – quantifiable but currently unknown.

**Implementation responsibilities/assignments** – Mayors Office; City Manager's Office

**Cost to implement/net savings from implementation** – zero cost to implement; savings unknown.

**Multiple benefits anticipated (in addition to greenhouse gas reductions)** – The benefits of such an awards ceremony are many and include:

- Increasing the rate of adoption of all GHG strategies implemented by the Climate Change Commission while
- Providing a yearly opportunity to reconvene all of the stakeholders to celebrate their success.

**Timeline for implementation** – The first awards ceremony should occur 1 year after the date of adoption of the City of Cincinnati's Climate Action Plan.

## Climate Protection Energy Task Team Green Permitting

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation #2C-5

#### Green Permitting and Green Building Professional education for City Approving Agencies

The City should implement a Green Permitting process to further incentivize green building. To assist with this process, each approving agency within the City should have a Green Building Professional designated to oversee approval of 'green' projects.

#### Estimated Annual GHG Reduction

#### Not Immediately Quantifiable

**Summary of specific issues** – Current approving agencies within the city have varying levels of familiarity with green building strategies. This often makes getting approvals for innovative sustainable strategies like grey-water harvesting, waterless urinals, and vegetated roofs difficult and often slows down the approval process. By designating at least one individual within each approving agency to be a “Green Building Professional” (LEED Accredited Professional, Green Roof Accredited Professional, or other similar industry standard) and creating an expedited approval process for projects employing sustainable strategies, the City could incentivize Green Building Strategies for new construction.

**Strategy/action plan** – The City’s Green Permitting program could be modeled after similar programs in Chicago, Burbank, San Antonio, and San Francisco (see attached) and could take the form of reduced/waived permitting fees, expedited review time, or both. The key to the success of such a program is to identify Green Building Professionals within the permitting agency to assist in the review of projects attempting to use this process. Training sessions are available for the LEED Rating System, and Green Roofs for Healthy Cities also hosts training sessions. The local Chapter of the USGBC could be a resource for these training sessions.

**Estimated greenhouse gas reduction to be achieved** – Not Immediately Quantifiable -Green building strategies have the potential to reduce national CO2 emissions by up to 39% according to USGBC figures.

**Implementation responsibilities/assignments** – The City’s department of Buildings and Inspections to start, but also local Zoning Boards, City Council, Regional Planning Commission, and MSD.

**Cost to implement/net savings from implementation** – Training and accreditation of staff would be a onetime cost of approximately \$1,000 per person. The costs of implementing the green permitting program would need to be evaluated by each department, but should be modeled after successful programs in other cities.

**Multiple benefits anticipated (in addition to greenhouse gas reductions)** – By further incentivizing green building within the city, the entire community will benefit, our image as a green city will increase, and retention/attraction of residents will be easier.

**Timeline for implementation** – Training of staff – by end of 2008 Investigation/analysis of green permitting by other cities – May 2008 Format Cincinnati’s Green Permitting Program – September 2008 Implementation of Cincinnati’s Green Permitting Program – January 2009

## Climate Protection Energy Task Team Building Design Award Program

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation 2C-6

Institute a design award program partnering the local design community with the regional governments to honor architecture, interior design and landscape architecture that not only exhibit design excellence, but also achieve the green goals of sustainability.

#### Estimated Annual GHG Reduction

#### Not Immediately Quantifiable

**Summary of specific issues** – There are many groundbreaking built projects in our community that incorporate green building strategies while creating striking and creative built environments. These projects maximize natural daylight, reduce energy consumption, use sustainable materials, maintain high levels of indoor air quality, preserve the site's natural surroundings, use the area's natural resources, and other demonstrable areas of sustainable design.

These projects need to be showcased and made more visible. The increased exposure will help the general public see how green strategies are incorporated into projects. With increased exposure, green building strategies will become more mainstream, even to the point of competitively inspiring people to advance toward carbon neutrality.

**Strategy/action plan** – The City and County could team up with the American Institute of Architects Cincinnati Chapter - Committee on the Environment (AIA-COTE) to help organize and advertise the existing annual AIA-COTE Sustainability Awards Program. The awards currently highlight built and unbuilt projects that combine green strategies with excellent design. AIA-COTE currently partners with the local chapters of the International Interior Design Association (IIDA), the American Society of Interior Designers (ASID), and the American Society of Landscape Architects (ASLA).

The awards program could be expanded to include City of Cincinnati and Hamilton County. With the presence of representatives from these entities, especially at the awards ceremony, it will bring news coverage and advertising.

The winning projects could be presented on boards and shown in the lobbies of our municipal buildings. The projects could also be highlighted on each party's website with links to the AIA-COTE webpage. Tours could also be organized. Other ideas from the City and County to increase the exposure of the awards would be appreciated.

**Estimated greenhouse gas reduction to be achieved** – See other templates for lowering the GHG emissions of the local building stock.

**Implementation responsibilities/assignments** – AIA-COTE and its partners IIDA, ASID, and ASLA currently plan the entire event. The groups advertise the event, create the submission package and collect submissions. Cleveland AIA-COTE is typically the jury for the awards. An awards banquet is planned every year to announce the winners and give out awards. Awards are showcased on the AIA-COTE website. [www.aiacincinnati.org/Committees/COTE/](http://www.aiacincinnati.org/Committees/COTE/)

With the City and County partners, a "Local Favorite Award" could be created that is chosen from the submissions by a team of 3-5 officials from the City of Cincinnati, Office of Environmental Quality and the Hamilton County Solid Waste Management District.

Climate Protection Energy Task Team - Building Design Award Program (continued)

Advertising of the awards and public presentations could be shared between the partnering entities.

**Cost to implement/net savings from implementation** – The program is currently funded by sponsors. Additional costs would be minimal to expand to include the City and County, including the cost to print and display the posters of the winning projects.

**Multiple benefits anticipated (in addition to greenhouse gas reductions)** – The increased exposure will help educate the general public about green building and help make it a part of the general vocabulary of our community. Also, partnering between municipal and non-profit groups will be beneficial, not only for the awards, but also for future projects that could use the City and County's help in advertising the events.

**Timeline for implementation** – The program is already in place and it is conceivable that the partnering could be created in time for the 2008 awards.

## Climate Protection Energy Task Team Greenlight Districts

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation #2C-7

Market brown fields as Greenlight Districts, indicating a “zone where the City gives a ‘green light’ on use of Tax Incremental Financing and other economic development tools within the corridor to attract businesses, especially ‘green’ industries.

#### Estimated Annual GHG Reduction

N/A

**Summary of specific issues** – A greenlight district is a geographical area, usually a brownfield, where public financing, in the form of TIF, Enterprise Zone abatements, or other incentives are used to encourage environmentally focused industry. The purpose of a greenlight district is therefore three-fold.

1. It enables a city to remediate an existing brownfield. 2. It strengthens a city’s economic base. 3. It encourages innovation in environmentally friendly technologies and practices.

**Strategy/action plan** –The City of Cincinnati will need to develop a method of financing and awarding the greenlight district and also to determine a proper location.

Due to a state imposed limit on area wide TIF, it is recommended that the City of Cincinnati pursue a greenlight district through a combination of two financing methods: Application for brownfield remediation money from the State of Ohio, and Enterprise Zone property tax incentives.

Funding sources and method for awarding it already exist for the proposed greenlight district., However, to focus development on environmentally related industry, it will be necessary to develop an additional incentive. This can be done through an expedited award process. Development of an expedited award will require a legal review of Ohio law related to Enterprise Zones and a set of criteria to define if a business is an environmentally focused. Finally it is recommended that businesses participating in the greenlight district also apply for the commercial portion of the LEED tax abatement if appropriate.

The Mill Creek Valley is ideal for this type of investment for many reasons. 1. It is an area that is likely eligible for brownfield remediation grants. 2. It is located within the City of Cincinnati Enterprise Zone. 3. Area residents may make up an environmental justice community due to their long-term exposure to the pollutants of the Cincinnati industrial base.

**Estimated greenhouse gas reduction to be achieved** – To be determined. Infill development and densification of the urban core will help preserve vegetation on greenfields and help reduce travel distances resulting in fewer vehicle miles travelled.

**Implementation responsibilities/assignments** –The Community Development Department and the Economic Development Division will have joint responsibility for development of this program. Tasks include creating a method to determine if a business is environmentally related, developing a standardized application for the greenlight district program, developing a process by which incentives can be expedited, and creating a method by which residents of the greenlight district or the surrounding areas benefit from this program.

Climate Protection Energy Task Team – Greenlight Districts (continued)

**Cost to implement/net savings from implementation** –Costs of this program will include staff time (likely one additional FTE will be needed to manage the program). Other costs would be the opportunity loss of property tax that was exempted through the EZ, as well as opportunity loss in other brownfield redevelopment activities.

**Multiple benefits anticipated (in addition to greenhouse gas reductions)** – This program will expand Cincinnati’s economic base, making it a better city for businesses focused on the environment. This program will help clean up the Mill Creek Valley and provide opportunities for residents in environmental justice communities.

**Timeline for implementation** –

## Climate Protection Energy Task Team Carbon Offset Commission

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 2C-8

Establish the City of Cincinnati Carbon Offset Commission.

**Estimated Annual GHG Reduction**  
**quantifiable**

**Not immediately**

**Summary of specific issues** – The City of Cincinnati Carbon Offset Commission will allow Cincinnati residents interested in having a "zero carbon footprint" who currently buy offsets for their carbon producing activities from organizations in other regions (and even other countries) the ability to purchase their offsets locally. The Mission of the organization would be to provide high quality local carbon offset products for local consumers' dollars that would otherwise fund projects elsewhere. It would be similar to Chicago's program. According to a recent article in the NY Times, Delta Airlines may begin selling \$4 carbon offsets to its passengers who want to reduce the CO2 generated from their trips. There is no reason they should pay a company or not-for-profit in Chicago or NY or Washington or Geneva when Cincinnati can set up its own organization here to invest Cincinnati dollars in high quality activities that will reduce CO2 here in our community. Additionally, this is a potential source of funding for any of the other proposals to come out of this task force.

The collective benefits of a City of Cincinnati Carbon Offset Commission include both reduction of GHG and further stimulation of Economic growth, providing additional funding for a range of GHG projects.

**Strategy/action plan** – Have the Director of OEQ nominate and the City Manager confirm 3 members from each task force team (Transportation, Energy, Waste, Land Use, and Advocacy) and 3 members from the Climate Change Commission itself (for a total of 18) to the new Commission. And further assign a coordinator familiar with the climate change process from the City of Cincinnati as a meeting facilitator. Require that 100% of the proceeds of the Commission go towards funding GHG projects.

Charge the membership of the City of Cincinnati Carbon Offset Commission to elect a chair and establish by laws for operation.

Estimated greenhouse gas reduction to be achieved – not immediately quantifiable

**Implementation responsibilities/assignments** – Office of Environmental Quality; City Manager

**Cost to implement/net savings from implementation** – *zero cost to implement; savings unknown.*

Multiple benefits anticipated (in addition to greenhouse gas reductions) – The benefits of a City of Cincinnati Carbon Offset Commission are many and include:

- Providing funding for the adoption of GHG projects implemented by the Climate Change Commission, while
- Providing opportunities for citizens to designate, raise money and fund GHG projects in Cincinnati.

**Timeline for implementation** – The nominations for membership in the City of Cincinnati Carbon Offset Commission should be mailed/communicated to the public immediately upon the adoption of the City of Cincinnati's Climate Action Plan.

## Climate Protection Energy Task Team Electricity Generation

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 2C-9

Encourage Duke Energy to reduce the carbon intensity of its generation portfolio.

#### Estimated Gross Annual GHG Reduction

**TBD**

Duke Energy Ohio is committed to reducing carbon dioxide emissions from its generation fleet by 60 to 80 percent by 2050, presuming federal climate change legislation is implemented that supports that goal.

#### **Summary of specific issues - *Need for a carbon price to move the economy toward carbon free energy***

Duke Energy Ohio is required by law to provide its customers with reliable, least-cost generation that meets all state and federal requirements. In order for Duke Energy Ohio to significantly reduce the carbon footprint of the generation mix that serves greater Cincinnati, non-carbon producing technologies must become cost-effective relative to high-emitting technologies. This can only occur via a federal program that associates a price signal with carbon dioxide emissions. New technologies that will be deployed include renewable energy sources and carbon capture and storage technology for coal-fired generation. The lack of a federal regulatory program that results in inclusion of a carbon price currently precludes most low carbon generation options because they are not cost-competitive with traditional generation resources. A federal program is necessary to reach the environmental goals in a timely and cost-effective manner.

#### ***Need for an adequately funded R&D program to develop new low and no carbon technologies***

If designed properly, a federal cap and trade program will result in needed emission reductions and support Cincinnati's goal. The federal program must also provide a steady source of funds in the early years to advance technological innovation in the areas of energy efficiency, renewables, carbon capture and storage, clean transportation and other low and no carbon technologies.

#### ***Need to meet environmental goals without undue economic impacts on Cincinnati residents and businesses***

Ohio is one of 25 states that currently rely on coal-fired generation for at least 50% of their electric generation. A properly designed federal cap and trade program will allocate free carbon dioxide allowances to the regulated entities (like Duke Energy Ohio) that provide electricity to customers, based on historic emissions, with the number of allowances decreasing over time. This will allow Duke Energy Ohio to minimize rate impacts to the residents and businesses of the Cincinnati area while making the transition to low-carbon technologies. For example, technology required to capture and store carbon dioxide emissions from coal-fired generation is expected to become commercially available in the 2020-2025 timeframe. Once available, it will cost utilities like Duke Energy Ohio billions of dollars to deploy the technology. Free allowance allocation will ensure the residents and businesses of the greater Cincinnati area do not pay twice for achieving greenhouse gas emission reduction goals – once in the early years to pay for allowances before the necessary emission reduction technology is available and a second time to pay for deployment of the technology.



Climate Protection Energy Task Team – Electricity Generation (continued)

**Strategy/Action Plan** - The City of Cincinnati and Duke Energy Ohio should advocate for well-designed federal legislation to support Duke Energy's goal of a 60 to 80% emission reduction.

**Implementation responsibilities/assignments** - Duke Energy will serve as the primary advocate for federal legislation. The City of Cincinnati will work with Duke Energy in support of its advocacy efforts, where it is mutually beneficial.

Duke Energy is already involved in several R&D efforts to support development of low and no carbon technologies, including the Electric Power Research Institute, and three of the seven US Department of Energy Carbon Sequestration Regional Partnerships. Duke Energy will continue to support R&D efforts as additional funding becomes available.

Once federal legislation is enacted, Duke Energy will be responsible for developing and implementing strategies to meet federal compliance obligations in a cost-effective manner.

**Cost to implement/net savings from implementation** - Costs to the City to advocate for properly designed federal climate change legislation would be minimal as Duke Energy will be primarily responsible for that task.

It is anticipated that climate change legislation could cause electric rates to double by 2030. However, the near-term impacts on Duke Energy Ohio's customers will be highly dependent on carbon dioxide allowance prices and how allowances are allocated. Free allowance allocation will minimize rate impacts and subsequent economic impacts on Cincinnati because costs will be limited to those needed to pay for new low-emitting technologies. If Duke Energy Ohio is required to purchase allowances before low-emitting technologies are widely available, customers will be required to pay an additional 23 to 32 percent in 2020, assuming allowances cost about \$22.00. If allowances in 2020 cost about \$66.00, the additional rate increase would be about 65% to 95%.

**Multiple benefits anticipated (in addition to greenhouse gas reductions)** - Properly designed federal legislation will accelerate greenhouse gas emission reductions while minimizing overall costs to Cincinnati residents and businesses. Additional benefits include accelerated incentives for increasing energy efficiency and new technology development and deployment. Over time, we will also benefit from increased energy independence and security. For example, the inclusion a carbon price will make gasoline and diesel fuel more expensive and result in electrification of the transportation sector, reducing our reliance on foreign oil. As we move to low-emitting technologies, criteria pollutant emissions will also decrease from the electric and transportation sectors, resulting in ambient air quality improvements. Finally, R&D activities usually result in development of new technologies not anticipated by the original program, which would result in currently unknown benefits.

**Timeline for Implementation** - Duke Energy is currently engaged in advocacy activities at the federal level and will continue this activity through the legislative and regulatory process.

Once legislation has been enacted, Duke Energy will immediately begin implementation of emission reduction strategies.

**Climate Protection Energy Task Team  
State and Federal Policy Action**

**TASK TEAM WORK GROUP RECOMMENDATIONS**

**Recommendation # 2C-10**

<b><u>Estimated Annual GHG Reduction</u></b>	<b><u>N/A</u></b>
----------------------------------------------	-------------------

**See 1C-5**

## **Appendix VI**

### **Waste Task Team Recommendations**

## Climate Protection Waste Task Team Cart-Based Recycling Program

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 1

Using larger containers could conservatively yield a 25% increase in the amount of materials recycled. Residents recycle more material with carts because they have a greater capacity and are easier to use than traditional curbside bins.

#### **Estimated Annual GHG Reduction – 2012**

**19,967 tons**

The amount shown above does not include the GHG reduction of the current residential recycling program. These amounts are the increase in reductions over the current program.

**Summary of specific issues** - Cities throughout the United States are realizing the benefits of increasing the size of curbside recycling containers. Cities such as Baton Rouge, Denver, Dallas, and Fort Worth are currently using wheeled carts, instead of traditional bins, for curbside recycling collection.

#### *Successes*

As shown below, using larger containers typically yields an increase in the amount of recyclables collected because wheeled carts provide more capacity and convenience.

Community	Change in Recycling Rate	Change in Participation Rate
Fresno, California <sup>11</sup>	260% increase in tons recycled	16% to 65% increase depending on the route
Virginia Beach, Virginia <sup>12</sup>	280% increase in tons recycled	21% increase in participation
Baton Rouge, Louisiana <sup>13</sup>	25% increase in tons recycled	Not Available

To be conservative, we are projecting a 25% increase in the quantity of mixed recyclables that are received and a 15% increase in participation, after Cincinnati replaces the 18-gallon bins with carts.

#### **Strategy/action plan**

There are two options to implement a cart-based recycling program:

1. When bidding recycling collection, the City could require the hauler to purchase the carts. If this option is chosen, it is recommended to enter into a long-term contract with the hauler so the hauler can amortize the costs of the carts. An additional benefit is the hauler holds responsibility for cart delivery and maintenance.
2. The City could purchase the carts through a financing structure such as a lease-to-own. With this option, the City could deliver and maintain the carts or contract this service to a third party, such as a waste hauler.

<sup>11</sup> R.W. Beck

<sup>12</sup> R. W. Beck

<sup>13</sup> City of Baton Rouge website: [www.brgov.com](http://www.brgov.com)

Climate Protection Waste Task Team - Cart-Based Recycling Program (continued)

Regardless of the option chosen, switching to a cart-based recycling system requires a phased-in approach. The phase-in could range from several months to a few years.

Currently, about 40 percent of Cincinnati households participate in the curbside recycling program. It is recommended to have residents register for a cart, versus providing a cart to every homeowner. The program will be phased-in by neighborhood.

If a household has concerns about space, they could still use their 18 gallon curbside bin.

**Estimated greenhouse gas reduction to be achieved** - If the quantity of mixed recyclables is increased by 25% and program participation is increased by 15%, approximately 4,708 additional tons of residential mixed recyclables will be recovered each year. Using the USEPA WARM Model, this yields a reduction of 19,967 tons of CO<sub>2</sub>. The WARM Model calculates this reduction to be equivalent to removing approximately 3,930 cars each year.

**Implementation responsibilities/assignments** - Cincinnati Public Services**Cost to implement/net savings from implementation**Gross Costs

The average cost for a 64 gallon wheeled cart is \$47, for a total cost of \$2.82 million, if 60,000 households registered for a cart. As discussed in the strategy, there are two ways the City could provide this program:

1. When bidding recycling collection, the City could require the hauler to purchase the carts. If this option is chosen, it is recommended to enter into a long-term contract with the hauler, such as a 7 year contract so the hauler can amortize the costs of the carts. An additional benefit is the hauler is responsible for cart delivery and maintenance. This option would not require a large capital investment by the City; however, the per unit cost for curbside recycling could increase.
2. The City could purchase the carts through a financing structure such as a lease-to-own. For this option, the City could deliver and maintain the carts or this service could be contracted to a third party, such as a waste hauler.

*Advertising* – Traditionally, the City of Cincinnati spends approximately \$68,000/year on recycling outreach. It is recommended that this funding be used solely for the education about the carts, during the initial phase of the program.

Gross Savings

Approximately 40,000 Cincinnati residents participate in the curbside recycling program, currently generating 530.50 pounds per household of recyclables every year. It is estimated the City will see a 15% increase in participation and a 25% increase in tons recycled. With a baseline of 97,796 tons of waste and 10,760 tons of recycling, Cincinnati would increase recycling to 15,468 tons and decrease waste to 93,089 tons. This would increase Cincinnati's diversion for mixed recyclables rate to 14.25%<sup>14</sup>. Annual waste disposal savings would equal \$117,688 - the tipping fee at the landfill is approximately \$25/ton. Because

---

<sup>14</sup> This diversion rate does not include green waste.

Climate Protection Waste Task Team - Cart-Based Recycling Program (continued)

trash is collected using City staff and equipment, while recycling is collected by Rumpke on a flat rate basis, savings for collection and hauling are expected to approximately equal to disposal savings.

Potential Revenue

Currently the City of Cincinnati receives grant funds based on the amount recycled through the Hamilton County Solid Waste Management District's Residential Recycling Incentive Program (RRI). On average, the City annually receives \$340,000. These funds are used to offset the cost of the curbside recycling program. By increasing recycling through carts, the City has the potential to receive an increase in RRI funds.

**Multiple benefits anticipated (in addition to greenhouse gas reductions)**

1. Reduced litter
2. Customer satisfaction - the carts are easier to move, hold more materials, require no lifting, and have lids for easy outside storage.
3. Reduced waste disposal costs
4. Increased worker safety and reduced injury.
5. Increased collection efficiency

**Timeline for implementation** – *The milestones and dates when they will occur.*

## Climate Protection Waste Task Team Buying Green/Environmentally Preferred Purchasing

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 2

Increase the City government's purchasing of environmentally preferable goods and services, including recycled content products.

#### Estimated Annual GHG Reduction

Unknown

**Summary of Specific Issues** – Buying Green/Environmentally Preferred Purchasing (“Buying Green”) refers to the practice of procuring goods and services “...that have a lesser or reduced effect on human health and the environment when compared with competing products or services that serve the same purpose...”<sup>15</sup> As such, buying green offers the potential to reduce GHG emissions.

To encourage buying green, the City of Cincinnati enacted Ordinance No. 141-1994 (copy attached). The primary components of this legislation are:

- All City departments, boards and commissions shall specify environmentally preferable supplies, services or construction, when appropriate;
- All City agencies shall conduct reviews of specifications aimed at removing unnecessary obstacles to and to encourage the procurement of recycled content products;
- The designation of appropriate bids as “environmentally preferable comparison” bids and the allowance in such designations of a three percent (3%) price preference for products that contain recycled content material; and
- The annual reporting to the City Council of the results of these efforts.

The issue related to this recommendation is the need to document the City agencies’ on-going implementation of the requirements of the ordinance and to increase the amount of green buying that they do.

**Strategy/action plan** – The City Administration should direct all City agencies to reinvigorate their efforts to buy green. Agencies should do this by:

- Describing current buying green efforts;
- Conduct a review of existing and proposed specifications to identify opportunities to make environmentally preferable purchases. This should include recycled content products, energy saving supplies and equipment, and purchases that otherwise eliminate or reduce the volume and toxicity of waste and by-products that a given product generates in its manufacture, use and disposal;
- To the maximum feasible extent, incorporate the use of “green building” methods and techniques in construction projects;
- Developing a plan for implementing improvements to its buying green efforts; and
- Document and annually report all of these efforts to the City Purchasing Agent, who will include them with the annual report to the City Council.

The Administration should also investigate the potential for cooperative green purchasing with the County, the Cincinnati Public Schools, University of Cincinnati, and through any appropriate State contracts that might be in place.

---

<sup>15</sup> USEPA website: <http://www.epa.gov/epp/pubs/about/about.htm>, accessed 1/24/08

Climate Protection Waste Task Team - Buying Green/Environmentally Preferred Purchasing (continued)

**Estimated greenhouse gas reduction to be achieved** – The USEPA has developed the Recycled Content (ReCon<sup>16</sup>) model to help companies and individuals estimate life-cycle GHG emissions and energy impacts from purchasing and/or manufacturing materials with varying degrees of post-consumer recycled content. ReCon calculates the benefits of alternative recycled content purchasing decisions.

While difficult to predict at this time, examples of net GHG emission reductions resulting from intensified buying green efforts can be made based on a number of different assumptions. If, in a hypothetical example<sup>17</sup>, the recycled content of printer paper were to be increased from 5 percent (5%) to thirty-five percent (35%) on the purchase of 10,000 reams of paper per year, the following GHG and energy reductions would be achieved:

**GHG Reductions**

	CO2 Tons
The life-cycle greenhouse gas emissions for the baseline manufacturing scenario are:	<b>19</b>
The life-cycle greenhouse gas emissions for the alternate manufacturing scenario are:	<b>36</b>
<b>The greenhouse gas benefit associated with increasing the fraction of recycled inputs is:</b> Note: negative value indicates GHG emission reductions, i.e., benefit.	<b>55</b>
<b>The greenhouse gas benefit in terms of passenger cars not driven for one year:</b>	<b>10.84 cars</b>

**Reduction in Energy Consumption**

The life-cycle energy consumption for the baseline manufacturing scenario is:	<b>911.66 MMBtu</b>
The life-cycle energy consumption for the alternate manufacturing scenario is:	<b>790.46 MMBtu</b>
<b>The energy benefit associated with increasing the fraction of recycled inputs is:</b> Note: negative value indicates energy savings, i.e., benefit.	<b>-121.19 MMBtu</b>
<b>The energy benefit in terms of gallons of gasoline not consumed:</b>	<b>976.98 Gallons</b>

This illustration shows that buying green can reap some GHG energy consumption reduction benefits. This example uses only printer paper, and with hypothetical quantities. In reality, the City purchases large quantities of many other additional paper products, from sticky notes and envelopes to paper towels. In addition, the City purchases building materials, carpeting, and a wide range of materials and supplies,

<sup>16</sup> From USEPA website: [http://www.epa.gov/climatechange/wycd/waste/calculators/ReCon\\_home.html](http://www.epa.gov/climatechange/wycd/waste/calculators/ReCon_home.html)

<sup>17</sup> Results from use of ReCon model, with hypothetical quantities of paper purchases



Climate Protection Waste Task Team - Buying Green/Environmentally Preferred Purchasing (continued)

from automotive parts to traffic cones. All of these purchases represent the potential to increase the effort to buy products with recycled content.

**Implementation responsibilities/assignments –**

City-wide Directive to Improve Buying Green Efforts: City Manager  
Conduct of Reviews/Development of Buying Green Plans: All City agencies  
Annual Report to City Council: City Purchasing Agent

**Cost to implement/net savings from implementation** – The precise costs and savings of this recommendation are difficult to predict at this time. The conduct of the reviews, the development of improvement plans, and the annual reporting are all assumed to occur using existing staff/resources.

**Multiple benefits anticipated (in addition to GHG reductions)** – In addition to reducing GHG emissions, buying green also “closes the loop” in the recycling process. The purchase of recycled content products helps to sustain the viability of recycling by adding to the market demand for such products.

**Timeline for implementation** – The directive to all City agencies should be issued immediately. The City agencies should be given 90 days to conduct their reviews and develop their improvement plans. By March 1<sup>st</sup> of each calendar year, the City Purchasing Agent should submit the annual report to the City Council.

## Climate Protection Waste Task Team Commercial Recycling

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 3

Encourage local businesses to recycle.

#### **Estimated Annual GHG Reduction**

**130,000 tons in 2012**

**Summary of specific issues** - Within the City of Cincinnati, recycling is highly encouraged for home owners. A well managed curb side recycling program has been in place for many years. However, the business sector remains a largely untapped area that could have significant impacts in reducing solid wastes. Ohio's Environmental Protection Agency estimates that 70% of all landfilled wastes are generated by businesses.

The City of Cincinnati is encouraged to work with the business sector to look at ways to first, minimize solid waste, and second, reuse and recycle wherever feasible. The Commercial and Industrial Work Group looked at many options including educational campaigns, institution of a regional internship program to work with the business sector on the execution of waste minimization and recycle projects, and enforcement through institution of a recycling ordinance into the city Code of Regulations. This work group is recommending that the first area of emphasis be a focus on office paper recycling as OEPA estimates that 40% of business waste is paper.

Besides reducing greenhouse gas emissions, an effective office paper recycling program will offer the following benefits.

- Increase public education by changing habits at work.
- Decrease in waste costs for businesses
- Stimulating local paper recycling economy
- Reduce waste deposited in area landfills thus increasing area landfill life expectancies
- Positive work environment and increased self-worth of employees who feel they are benefiting the environment and working for a company with civic responsibility.
- Adjacent business cooperatives create a solid downtown business foundation. Business leaders are proud of the city and are more likely to support each other.
- Positive publicity for downtown business and the City of Cincinnati.

There are numerous businesses operating in the Cincinnati metropolitan area that should be included within the scope of this project:

- Public sector: examples include government services, colleges and universities, and schools
- Industrial sector: examples include manufacturing plants, distribution centers, and warehouses
- Service sector: examples include corporate offices, hospitals and medical centers, hotels, restaurants, shopping centers, and banking institutions.

#### **Estimate of Greenhouse Gas Emissions Reduction**

The estimated potential Greenhouse Gas Emissions reduction, measured in Carbon Dioxide Equivalents (CO<sub>2</sub>), is 130,000 tons. This is equivalent to taking 26,000 cars off of Cincinnati neighborhood streets.

The following assumptions were made to estimate the Greenhouse Gas Emissions Reduction potential (as CO<sub>2</sub>) from the institution of an office paper recycling program within the City of Cincinnati business community.

Climate Protection Waste Task Team - Commercial Recycling (continued)

- In 2006, US residents, businesses, and institutions produced more than 251 million tons of municipal solid waste, which is approximately 4.6 pounds of waste per person per day. (reference: <http://www.epa.gov/msw/facts.htm>)
- Assume trash generation per person within the City of Cincinnati is approximately equal to the US total. With a population of approximately 333,000 (recent census estimates), this equates to almost 756 tons/day of municipal solid waste. ( $333,000 \text{ persons} * 4.6 \text{ lb trash/person/day} * 1 \text{ ton}/2000 \text{ lbs} = 756 \text{ tons/day}$ )
- Assume 70% of landfilled waste is from business operations of which 40% is paper material. Thus, approximately 214 tons per day of paper material is landfilled daily from Cincinnati businesses. ( $756 \text{ tons/day} * 70\% * 40\% = 214 \text{ tons/day}$ )
- Assume the recycling program can reduce the amount of paper landfilled by 50%. Therefore 107 tons per day, equal to 39,000 tons/year, would be recycled. A 50% reduction is very aggressive, but Harvard University already recycles 44% of its paper waste, showing that this is a feasible number (see addendum: Case Study #1)
- Using USEPA's WARM Model (**W**Aste **R**eduction **M**odel), recycling 39,000 tons/year of mixed office paper will reduce carbon dioxide emissions (CO<sub>2</sub>) by 130,000 tons, equivalent to removing over 26,000 cars from the area roadways.

**Strategy/action plan – 3 Stage Commercial and Industrial Paper Recycling**

1. Launch a Dynamic Educational Campaign that will encourage commercial and industrial institutions to start recycling.
  - a. The campaign should include the City as an institution that leads by example by publicizing the City's current recycling efforts.
  - b. The campaign should include a general employee survey for three purposes:
    - i. To prepare employees for changes.
    - ii. To receive departmental input on recommendations for a successful recycling program.
    - iii. To gain an understanding of the level of training necessary for employees.
  - c. The campaign should encourage adjacent businesses recycling cooperatives to overcome space limitations and reduce hauler collection costs and energy output. This step will also help to plan for future expansion of recycling program.
  - d. The campaign should encourage businesses to "Plan before you Print" in an effort to reduce paper usage, which may help to offset any costs associated with implementation of a recycling plan.
2. The initiative could expand on Hamilton County's current Recycling at Work program by hiring interns to supply technical assistance and distribute supplies and information to city businesses and institutions. Four interns working 30 hrs per week through Cincinnati's Office of Environmental Quality at \$11/hr would cost \$69,000/yr.
3. Mandate paper recycling in all businesses employing 11 or more employees.
4. Require all Waste Haulers providing services in the city to offer paper-recycling options to all businesses employing 11 or more employees.

**Cost to implement**

The cost to implement this program includes the costs for the interns plus the costs for the educational campaigns. These costs could be offset against the lower tipping fees of \$975,000 ( $\$25 \times 39,000 \text{ tons}$ ) as a result of the reduction in land filled waste.

Climate Protection Waste Task Team - Commercial Recycling (continued)**Timeline for implementation**

1. The remainder of the year 2008 should be spent with the City expanding and refining its own recycling efforts by carrying out the Recycling Promotions Plan as assembled by the Department of Public Services, et al. The Recycling Promotions Committee should organize and prepare the Educational Campaign, a type of syllabus/schedule for the anticipated interns and prepare budget accordingly to enact the Campaign early in 2009.

## Sample Intern Schedule:

## First quarter:

1. Research City businesses including ones that are and are not recycling and target potential businesses of interest, research size of businesses and land spacing, research potential adjacent business cooperatives by vicinity and waste materials (i.e. retail, office, commercial), recycling resources available, etc.
2. Learn/refine Commercial Recycling Educational Campaign

## Second quarter:

1. Reach out/network to businesses. Field work.
2. Connect businesses to recyclers.

## Third quarter:

1. Employee educational seminars.
2. Train business employee to take over Intern's responsibilities.
3. Monitor program.

## Fourth quarter:

1. Monitor program.
2. Turn over all responsibilities to business staff.

2. Stage 1: The first pair of six-month interns should begin work in January 2009. The second pair of six-month interns should begin July 2009.
3. Stages 2 and 3 would require time for the city to write and pass an ordinance and develop infrastructure to enforce the ordinance. First mandates should be included in budget for 2009 and should be in action by late winter/early spring 2009. A subcommittee of the Steering Committee or another appointed/volunteer committee could be used to monitor and push legislation through City Council.

**Addendum****Case Study #1: Harvard University**

Harvard Recycling services 211 stops along 350-acre Cambridge and Allston campuses, and is considered the largest urban campus recycling program in the northeastern United States. From July 2005 to June 2006, Harvard University students, faculty, staff, and contractors diverted more than 2,600 tons of paper for recycling. Harvard's recycling program has also saved the Faculty of Arts and Sciences more than \$120,000 in the past five years and the Harvard Dining Services more than \$200,000 in the past eight

Climate Protection Waste Task Team - Commercial Recycling (continued)

years. These savings, in turn, fund recycling efforts such as the Resource Efficiency and Graduate Green Living programs.

Each building is responsible for administering their own program, which allows building managers to select their own style and approach to recycling. However, Harvard Recycling does provide some basic items, including signs, labels, specification sheets, desk side recycling baskets, and receptacles.

To boost recycling participation:

- Harvard educates the custodial staff about the benefits of recycling,
- Hosts annual tours of the paper processing plant,
- Sends out monthly Recycling Update newsletters to more than 1,400 students, faculty, and staff.
- Harvard also sponsors contests between undergraduate dormitories, awarding a "Green Cup" each year to the dormitory showing best improvement in recycling, waste reduction, and energy conservation.

Harvard's full-service recycling effort began in 1992 when it was decided to coordinate the disparate school and department recycling efforts. Since then, Harvard has raised its overall recycling rate from 5 percent of refuse in 1992 to 44 percent in 2006.

For information on Harvard's recycling program, visit  
<[http://www.uos.harvard.edu/information/dep\\_fac\\_sol.shtml](http://www.uos.harvard.edu/information/dep_fac_sol.shtml)>.

## Climate Protection Waste Task Team Reuse Network

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 4

Establish a Reuse Program for Large Items (e.g., appliances, furniture), which would increase diversion from landfill disposal

#### Estimated Annual GHG Reduction

Unknown

**Summary of specific issues.** – According to the US EPA<sup>18</sup>, between two and five percent of the waste stream is potentially reusable. Reuse conserves natural resources, reduces the amount of air and water pollution and GHG. It is also a means for getting materials to disadvantaged people and organizations<sup>19</sup>.

**Strategy/action plan** - The strategy is to create and/or publicize a Reuse Network that will increase public awareness and enable residents and businesses to decrease their landfill disposal. A unit pricing system (Pay As You Throw) could be implemented to further provide incentives.

**Estimated greenhouse gas reduction to be achieved** – According to the Hamilton County Solid Waste Management District, greenhouse gas reductions are very difficult to estimate for this proposal. While the WARM model has the ability to calculate reductions for appliances and carpet, it does not have an option for textiles or furniture. In addition, a strong reuse market already exists with thrift stores, antiques, and building reuse stores. It would be very difficult to estimate how much reuse is already happening. If two percent of Cincinnati's waste stream is reusable, 1,956 tons of material could potentially be diverted through a strong reuse program.

**Implementation responsibilities/assignments** – City of Cincinnati and Non-profit organizations to create the Reuse Network. City of Cincinnati to publicize Reuse Network, and set up and implement billing/fee for items in trash.

**Cost to implement/net savings from implementation** – The primary costs would involve the public awareness campaign. No estimate at this time, but a minimum of \$5,000. The savings would be approximately \$25 - \$30 per ton to the city, by avoiding disposal charges. The savings to the specific generator would be the fee for waste pick-up.

**Multiple benefits anticipated (in addition to greenhouse gas reductions)** – Disadvantaged people and organizations could receive needed materials. Donors could receive tax advantages. Recipients would save money that they would have spent if purchased.

#### **Timeline for implementation –**

\*90 days to create or coordinate Reuse Network and draft public awareness plan

\*6 months to publicize Reuse Network and implementation of waste fee for large items.

<sup>18</sup> From USEPA website: <http://epa.gov/garbage/sourcred.htm>

<sup>19</sup> From Reuse Development Organization, Inc., website: [www.redo.org](http://www.redo.org)

## Climate Protection Waste Task Team Electronic Waste Collection

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 5

Recycling electronic waste, such as computers and televisions, has a positive impact on greenhouse gas emissions. Many avenues exist to increase recycling of residential electronic waste in Cincinnati, including holding neighborhood collections and promoting the existing Hamilton County collection.

#### Estimated Annual GHG Reduction

**153-427 tons in 2012**

#### Summary of specific issues

Electronic waste (or e-waste) is the fastest growing component of the municipal waste stream. According to the International Association of Electronics Recyclers, Americans dispose of 2 million tons of electronic products a year including 50 million computers and 130 million cell phones. By 2010, the United States will be discarding 400 million electronic units annually. E-waste makes up about 2% of the waste stream.

Currently, Cincinnati residents can recycle their computers through Hamilton County Solid Waste Management District's Computer Recycling Drop-off program or by using one of the computer recycling companies in the area. In 2007, approximately 930 City of Cincinnati households dropped off computers through the Hamilton County program. Other households either store their old computers or dispose of them in the trash.

Recycling computers and other electronics reduces the chance that components such as lead, cadmium, and chromium will enter the environment. Computers and electronics require skilled laborers and specialized equipment to disassemble for recycling or refurbishing, which means the process usually has associated costs. However, many of the metals in computers have a very high value and help cover the cost of disassembly. Several Greater Cincinnati companies have computer recycling capabilities.

This recommendation focuses on residential e-waste disposal. Businesses must either recycle computers or be considered a generator of hazardous waste under the Resource Conservation and Recovery Act (RCRA). Due to components such as lead, cadmium, or chromium in computers, they can be considered hazardous material. (Ohio EPA [www.epa.state.oh.us/ocapp/p2](http://www.epa.state.oh.us/ocapp/p2)) RCRA does not cover residential generation and disposal of e-waste so residents can legally set out their computer with their trash.

#### Strategy/action plan

The City of Cincinnati could increase recycling of residential e-waste in the following ways:

1. Offering curbside pick-up of electronics through Cincinnati's established system of scheduling special pickups.
2. Holding a periodic computer recycling drop-off.
3. Promoting Hamilton County's program to Cincinnati residents.

Option 1- While curbside pick-up of e-waste would give residents the easiest disposal option, theft of the computer and personal information stored in the computer would be a concern. Another concern about curbside collection of electronics, according the NERC report *Setting Up & Operating Electronics Recycling/Reuse Programs: A Manual for Municipalities & Counties*, is, "...the material is generally of poor quality by the time it reaches a processor and therefore has less potential for reuse/repair. Materials



Climate Protection Waste Task Team - Electronic Waste Collection (continued)

left at the curb get wet and may not be handled as carefully as material at an ongoing program or special event.” For these reasons, this recommendation will focus on the last two options.

Option 2- Several communities in Hamilton County hold annual or semi-annual computer collection events in Hamilton County. Residents drop-off their e-waste at a predetermined point and city workers collect the computers and bring them to either Hamilton County’s program or a private company.

This option would require City staff time planning the event and staff time at the collection. The Hamilton County Solid Waste District could cover the actual recycling costs. Given the size of Cincinnati, it is recommended to conduct two events per year. Computers collected through this program would count toward Hamilton County’s Residential Recycling Incentive (RRI) program and could increase Cincinnati’s recycling rate.

Option 3- Many residents may not be aware of Hamilton County’s free computer recycling program. City of Cincinnati residents can drop off their computers at the St. Bernard drop-off from 8am to 4pm Monday through Friday in the City of St. Bernard most of the year. The City of Cincinnati could promote this service to their residents in community newsletters and on their website.

**Estimated greenhouse gas reduction to be achieved** -Estimating how many residents would use an event such as Option 2 is difficult. City of Cincinnati residents dispose of roughly 97,796 tons of waste a year. Using the national estimate of 2% of that waste stream as e-waste, residents dispose of 1,956 tons of e-waste every year. Two other communities in Hamilton County conduct computer collections and yield an average of 2.72 pounds per household. Cincinnati could expect with 148,095 households to collect approximately 201.41 tons of e-waste. According to EPA’s WARM Model Durable Goods Calculator, Cincinnati could reduce 427 tons of CO<sub>2</sub> a year by recycling e-waste collected at an event.

Another estimation could be based on the approximately 1% of households generally participating in computer recycling programs. Applying this average to the City of Cincinnati, approximately 1,500 households would participate in a computer recycling program. Multiplying 1,500 households by 95 pounds of computers/household<sup>1</sup> yields 72 tons of computers. Recycling 72 tons of computers yields 153 tons of CO<sub>2</sub>.

**Implementation responsibilities/assignments** -The City of Cincinnati Office of Environmental Quality or Public Services Department employees would need to adopt a collection program or promotion strategy. The Department would work with Hamilton County Solid Waste Management District to coordinate events or advertising campaigns that used Hamilton County’s Computer Drop-Off program.

**Cost to implement/net savings from implementation –**

Option 2- Staff time to plan and carryout event = 50 hours of staff time + staff time at the event (5 hours/person). Volunteers could be used to unload cars and stack computers on pallets.

Transportation costs of moving e-waste = Hamilton County’s contractor can pick up computers that are properly stacked on pallets and shrink wrapped for approximately \$200/truck

Advertising costs = minimal – primarily non-paid, such as press releases.



Climate Protection Waste Task Team - Electronic Waste Collection (continued)

Pallets = \$0 if City already has pallets on-hand

Shrink wrap = \$600

Gaylord boxes = \$15 - \$20/box X 50 boxes = \$750 - \$1000

Forklift = minimal if City owns a forklift.

Option 3- Staff time to plan advertising = minimal, approximately 30 hours of staff time/year. Duties include: updating website, submitting newsletter articles, educating customer service, and promoting at community council events and meeting.

**Multiple benefits anticipated (in addition to greenhouse gas reductions)**

- A reduced risk of cadmium, lead and other toxic materials entering the environment
- Donation of refurbished materials to local schools and nonprofits
- A reduced risk of residents' personal information being stolen
- Support of local computer recycling industries.

**Timeline for implementation** – The Hamilton County Solid Waste Management District's 2008 computer recycling program is open March 31 – December 30. Implementation of Option 2 or 3 in 2008

Option 2: It typically takes 4-6 months to plan, organize, and conduct a computer recycling program.

Option 3: March 1 – March 30: Develop advertising – update Cincinnati website, include information in City newsletters/emails, provide information to community councils, promote at City Council meetings, etc.

<sup>1</sup> – Average pounds per household at Hamilton County Solid Waste Management District's 2007 computer recycling collection program.

## Climate Protection Waste Task Team Foodwaste Composting

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 6

Increase diversion from landfill disposal those food scraps that can be composted into usable products

#### Estimated Annual GHG Reduction

**9,657 tons in 2012**

**Summary of Specific Issues** – The composting of food scraps offers opportunities to reduce GHG emissions, reduce the cost of and reliance on landfill disposal, and produce a valuable soil amendment product that improves the growth of plants.

According to the Ohio Department of Natural Resources<sup>20</sup>, food waste constitutes approximately 14 percent by weight of the waste being disposed at the Rumpke landfill in Hamilton County. At an annual overall waste disposal rate at Rumpke of approximately 1.9 million tons<sup>21</sup>, this represents approximately 266,000 tons of food waste. Even when reducing these amounts to reflect only waste generated from within Hamilton County (approximately 900,000 tons per year), the amount of food waste disposed at the landfill is still substantial – approximately 126,000 tons per year.

In addition to being residentially-generated, this food waste is also generated by a variety of commercial and institutional sources, including grocery/produce stores, food wholesalers, restaurants, hotels, hospitals, colleges and universities, local school systems, and such institutions as the Cincinnati Zoo and Findlay Market.

There are at least three major issues relating to the development of food composting in our area:

1.) *Lack of Infrastructure* – There is no existing infrastructure in place to compost food waste on a large scale, commercial basis. The components of a successful food waste composting infrastructure include:

- Generation – Organized, cooperative generators providing a steady flow of clean (not contaminated by non-compostables) food scraps;
- Transportation – Safe, clean and efficient transporting of food scraps to the composting facility;
- Processing Facility – Safe, clean and efficient operation of a properly sited and licensed composting facility, producing beneficial compost products; and
- Market – Well-defined end use of the output materials, providing specification-meeting compost products.

2.) *Potential for Problems if Not Done Properly* – Compared to other materials that are recycled, the diversion and composting of food waste presents some special challenges that must be addressed. At the point of generation and storage, during transportation, and in the composting process, food waste must be handled so as to avoid excessive odors or the attraction of vermin. Special expertise is required, particularly in the design and operation of the composting facilities.

3.) *Public Perceptions* – The “ick” factor should not be ignored. The “recyclability” of food waste is not as well recognized as the recycling of beverage cans or paper. There is a natural tendency for people to

<sup>20</sup> State of Ohio Waste Characterization Study, Ohio Dept. of Natural Resources, 4/21/04

<sup>21</sup> Staff Report on proposed expansion of Rumpke Sanitary Landfill, Attachment D to Manager’s Memo for 5/11/06 Policy Committee meeting

Climate Protection Waste Task Team - Foodwaste Composting (continued)

assume the worst about food waste composting. A concerted effort will be required to educate participants in all phases of any food waste composting project.

Notwithstanding these issues, food waste composting is a viable method to reduce GHG emissions and to divert materials from landfill disposal (see sections below). A recent nationwide survey by BioCycle magazine<sup>22</sup> indicates that the number of local communities served by residential source-separated organics composting programs has increased from 12 in 2006 to 42 in 2007. In addition, an informal Internet-based review of food waste composting programs reveals a large number of projects throughout the nation. In Ohio, projects are either in development or underway at PayGro (a commercial soil supplement producer in South Charleston, near Springfield), Barnes Nursery in Erie County (in Cleveland vicinity), and at Youngstown State University and Ohio University (Athens).

**Strategy/action plan** – The overall strategy is to increase awareness of food waste reduction and home composting efforts and to facilitate and encourage the building of an effective infrastructure to handle food waste composting.

After awareness is raised and an effective infrastructure is functioning, consideration could be given to the feasibility of residential curbside collection of food waste. The City of Cincinnati's transition to automated collection and the related use of wheeled carts would be consistent with the potential future curbside collection of food waste along with yard waste and other compostable organics. However, this would be dependent on the establishment of an effective composting facility to which organic materials could be taken.

This strategy can be pursued in the following ways – source reduction, residential composting efforts, and commercial/institutional composting.

*Source Reduction*

Reduce the amount of food scraps that are generated by:

- Providing information on avoiding/minimizing the generation of food waste;
- Encouraging programs that provide excess but safely usable food to people in need at food banks, soup kitchens, and shelters; and
- Encouraging projects that divert food waste to animal feed, where feasible.

*Residential Composting*

Develop and implement an extensive public information effort that:

- Provides details as to how to properly do home composting;
- Encourages at-home composters to include selected food scraps in their composting efforts; and
- Encourage vermicomposting (the use of special worms to aid the composting process).
- Supplement the public information efforts with programs to make available free or subsidized composting bins.

---

<sup>22</sup> "Source Separated Residential Composting in the U.S.," *BioCycle*, December 2007

Climate Protection Waste Task Team - Foodwaste Composting (continued)*Commercial/Institutional Composting*

Facilitate the development of a food waste composting infrastructure considering the components described above (generation, transportation, processing, and market). Consider not only potential participants that generate food scraps, but also entities that handle other types of organic, compostable materials such as yard waste, unrecyclable paper/fiber (like food-soiled cardboard), sawdust, and biosolids (from sewage treatment).

Facilitation can take many forms, including:

- Identify and bring together potential participants;
- Work with potential participants to explore feasibility and encourage development;
- Help to identify and satisfactorily resolve regulatory issues (permits, licenses, zoning, etc.); and
- Identify potential resources that could be beneficial to a proposed project, such as an Ohio Department of Natural Resources Market Development Grant or local sources of grant funding or in-kind services from involved Solid Waste Management Districts and from interested local governments.

**Estimated greenhouse gas reduction to be achieved** – The USEPA has developed a waste reduction model (WARM)<sup>23</sup> used to calculate relative GHG emissions resulting from various solid waste management activities. To paraphrase the USEPA's explanation:

...WARM calculates the benefits of alternative waste management decisions based on a life-cycle approach, which reflects emissions and avoided emissions upstream and downstream from the point of use. As such, the emission factors provided in these tools provide an account of the net benefit of these actions to the environment.

To use the WARM model, tonnages of specific types of materials can be input and comparisons will be calculated.

While difficult to predict at this time, estimates of net GHG emission reductions from a local potential food waste composting project can be made based on a number of different assumptions. If, for example, 100 percent of Hamilton County's approximate 126,000 tons of food waste were to be composted instead of landfilled, approximately 96,567 tons emissions would be reduced.

If 10 percent (12,600 tons) of that total food waste amount could instead be composted through a combination of diversion efforts, including a commercial/institutional scale composting project 9,657 tons of CO<sub>2</sub> emissions would be reduced.

More specific calculations of potential GHG emission reductions can be made based on the projected quantities of materials involved in any food waste composting project that is proposed by specific commercial or institutional participants.

Climate Protection Waste Task Team - Foodwaste Composting (continued)

<sup>23</sup> From USEPA website: [http://epa.gov/climatechange/wywd/waste/calculators/Warm\\_home.html](http://epa.gov/climatechange/wywd/waste/calculators/Warm_home.html) accessed 1/8/08

### **Implementation responsibilities/assignments –**

*Source reduction:* Mayor's Young Professional Kitchen Cabinet, in conjunction with interested local governments (e.g., City of Cincinnati and Hamilton County Department of Environmental Services) and local not-for-profit organizations (e.g., Free Store/Food Bank and others).

*Residential Composting:* Mayor's Young Professional Kitchen Cabinet, in conjunction with interested local governments (e.g., City of Cincinnati and Hamilton County Department of Environmental Services).

*Commercial/Institutional Composting:* City of Cincinnati and Hamilton County Department of Environmental Services jointly facilitate the development of a private commercial scale composting infrastructure.

Initial Cost - The precise costs and savings of these proposals are difficult to predict at this time, particularly for the development of the food waste composting infrastructure. Based on the prices being charged by existing food waste compost facilities in Ohio (\$26/ton Barnes) it is estimated that a facility capable of serving Cincinnati would cost approximately \$2 million.

Source of Capital – Private Entrepreneur, The City or Solid Waste District could initiate the process by issuing an RFP offering a long term commitment to supply food waste in exchange for the vendors commitment to build and operate the facility.

Life Cycle Cost/Payback Period -

7 – 10 years

Diversion of food waste from landfill disposal can save generators approximately \$25 - \$30 per ton by avoiding those disposal charges. Public information programs can cost from as low as \$5,000 to as much as \$75,000, depending on the extensiveness of the effort and the media employed.

If 12,600 tons of food waste were composted versus landfilling waste generators could save approximately \$315,000 - \$378,000.

**Multiple benefits anticipated (in addition to GHG reductions)** – As described above, the composting of food waste also provides a direct benefit of diverting material from landfill disposal, extending the life of existing disposal facilities. The successful marketing of compost products also provides economic spin-off benefits. Furthermore, the increased use of compost as soil amendments will enhance the growth of plants where used. Consider the synergy of using food waste-derived compost in a tree planting project to increase carbon sequestration and to further green-up the city!

**Timeline for implementation** – In the near term (2008), develop and implement enhanced public information programs to raise awareness of and encourage home composting of food waste.

Simultaneously, begin the facilitation efforts to develop the food waste composting infrastructure. Implementation of any resulting project(s) would possibly take longer (within a five year period), depending on the willingness and resources of the project participants.

## Climate Protection Waste Task Team Pay-As-You-Throw

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 7

A Pay-as-You-Throw program, or PAYT, provides a direct economic incentive to residents to reduce their waste. Under PAYT, the City would charge households for their waste collection based on the amount of waste they throw away.

#### **Estimated Annual GHG Reduction**

**77,733 tons in 2028**

**Summary of specific issues** - PAYT programs create a direct economic incentive for residents to reduce their waste, recycle, and compost. With such a system, some communities have seen a significant decrease in waste and an increase in recycling. Many residents also view this system as more equitable, because residents only pay for what they throw away. A household that recycles and reduces their waste will pay less than their neighbor who makes no effort to reduce his waste. Communities with PAYT programs have seen a significant decrease by about 17% in weight and an increase in recycling. There are over 7,000 PAYT programs in the United States<sup>1</sup>.

#### *Successes*

Many cities, both large and small, have implemented a PAYT system. Listed below are success stories from larger cities that have a PAYT system<sup>2</sup>.

Worcester, Massachusetts (pop. 172,600), decreased its waste management costs by \$1.2 million and increased its recycling rate from 3% to 36% immediately following the introduction of PAYT in 1993.

The recycling rate in San Jose, California (pop. 895,000), rose from 28% to 43% in the first year of its program (1993), and rose again to 55% by 1998.

In Tacoma, Washington (pop. 194,000), solid waste management costs fell by more than 50% in the PAYT program's first year, and the recycling rate tripled.

Potential obstacles with PAYT include:

- Commitment by community leaders.
- Initial capital investment for waste and recycling containers.
- Residents on a fixed income would have to potentially pay for waste collection.
- Development of billing system.
- Education – At least six months of intensive education is needed.
- Viewed as an additional tax – Cincinnati residents have never been billed for waste collection.

To implement a PAYT system, it is recommended to charge residents based on the size of container. The more garbage containers, the more a resident would pay for waste collection. Each household would receive a 35 gallon waste container at no charge. If residents require additional and larger containers, they would be charged for that added service. The average cost for a 35 gallon cart is \$40, for a total cost to the City of \$4,160,000 (based on 104,000 households).

Cincinnati residents currently receive unlimited waste collection through their taxes; therefore, residents do not understand the true cost of waste collection. This will be a challenge for the City to communicate to residents that not only will they be charged for waste collection, but the City will also eliminate city-

Climate Protection Waste Task Team - Pay-As-You-Throw (continued)

wide unlimited collection. It is recommended that the City continue to provide for the collection of large items, appliances, and tires on a call-in basis.

In addition to garbage carts, it is recommended that the City provide larger recycling carts for residents to accommodate the increase in residential recycling that will result with a PAYT system. The average cost for a 64 gallon wheeled cart is \$47, for a total cost to the City of \$4.9 million.

Education is a key component to PAYT. The City of Austin spent \$6-8 per household on education. This translates to \$630,000 - \$840,000 for the City of Cincinnati.

**Strategy/action plan**

Cities that have implemented PAYT typically spend three years planning for the program. The planning stages should include a thorough financial analysis that includes the capital costs, financing options, potential disposal savings, and setting a price structure for each size of cart. Plans should be developed to offer assistance to low-income and elderly residents. Additionally, commitment and buy-in by community leaders is crucial throughout the planning and implementation phases. Once costs and financial benefits are determined, community meetings should be held to introduce PAYT and address concerns from residents.

Before implementing a PAYT system, the City needs to design the rate structure. According to the USEPA, there are six steps to setting a PAYT rate structure<sup>3</sup>:

1. Forecast residential municipal solid waste amounts: Forecast the annual tonnage of MSW that is expected to be collected once PAYT is implemented.
2. Determine the MSW services to be provided, including types of containers and billing options. It is recommended that the City provide one 35-gallon wheeled garbage cart to all households. Additional garbage containers will be subject to a fee.
3. Estimate net costs of MSW
4. Determine PAYT revenues and MSW program cost coverage. Based on MSW costs and coverage objectives, calculate the estimated revenues you need to generate. This may be more or less than net MSW costs, depending on your community's other goals and financial resources.
5. Calculate PAYT rates. Calculate the price level necessary to pay for your program.
6. Adjust MSW services and PAYT rate structure. If the PAYT price level seems too high, consider less costly or more efficient MSW services and/or choose a PAYT pricing system that encourages a greater reduction in the solid waste (and MSW costs). Then recomputed the PAYT price structure.

*Communities Rate Structure*

Listed below are examples of PAYT communities' rate structures<sup>2</sup>:

Gainesville, FL - \$13.50/month for 35 gallon; \$15.96/month for 64 gallon; \$19.75/month for 96 gallon

Glendale, CA - \$6.45/month for 64 gallon; \$10.10/month for 100 gallon cart

Plano, TX - \$11.15/month for 95 gallon cart; \$12.50/month for each additional cart

Lansing, MI - \$1.50/30 gallon bag



Climate Protection Waste Task Team - Pay-As-You-Throw (continued)

It is recommended that the City phase-in the PAYT system. As seen in communities across the U.S., once a PAYT program is implemented, demand for recycling increases. In anticipation of this need, it is recommended that the first step towards a PAYT system is to provide 64 gallon recycling carts. Because of the capital costs involved, the City should phase-in the recycling carts. Further detail on larger recycling carts is included in Action Item – Recycling Carts.

The second step is to provide one 35-gallon garbage cart for all eligible households. If households require additional containers, they will be charged. As many communities have learned, residents may choose the least expensive option only to determine that an additional cart is needed.

All carts would be property of the City of Cincinnati. The City would be responsible for delivery and maintenance of the carts.

*Overcoming Obstacles*

**Illegal Dumping** – Illegal dumping is a perceived obstacle to implementing PAYT programs. A study by Skumatz Economic Research Associates found that residential waste is not a large component of illegally dumped materials. The largest components of illegally dumped materials are construction and demolition debris (25 percent) and brush (nearly 40 percent)<sup>4</sup>.

**Viewed as an Additional Tax** – It is recommended to conduct outreach, such as surveys or public hearings to receive feedback from residents on PAYT and to inform residents about the true costs of solid waste collection. Buy-in from residents and elected officials are crucial to the success of PAYT. If the City is changing the way people pay for waste collection, the City should determine if taxes that were previously used for waste collection can be lowered.

**Development of a Billing System** – This obstacle can be overcome by contracting with Cincinnati Water Works to oversee the billing.

**Excess Waste during Holiday Season** – Typically, 25 percent more waste is generated during the holiday season. It is recommended that the City offer a three week reprieve from Christmas through early January to account for the increased waste.

**Estimated greenhouse gas reduction to be achieved** - Based on a USEPA study, PAYT programs reduce greenhouse gas emissions by .343 tons per capita<sup>5</sup>.

According to the 2006 US Census, the average household size in Cincinnati is 2.18. Multiplying 2.18 by 104,000 households that are eligible for Cincinnati's waste collection is equal to 226,720 people. Multiplying 226,720 by .343 tons equals 77,733 tons.

**Implementation responsibilities/assignments** - Cincinnati elected officials – Provide support for the program, conduct public hearings on PAYT.

Cincinnati Public Services – Design rate structure. Attachment A includes the necessary forms to be completed when designing a rate structure.



Climate Protection Waste Task Team - Pay-As-You-Throw (continued)**Cost to implement/net savings from implementation***Costs*

Garbage carts – minimum of \$4.2 million, as every household will receive a 35-gallon wheeled garbage cart. The carts could be financed over a five year period.

Education - \$630,000-\$840,000

*Revenue*

Revenue from billing system – to be determined when rate structure is developed.

*Savings*

Disposal Savings - \$415,625 annually (Based on 17% reduction in waste)

On average, Cincinnati disposes of 97,796 tons/year. A 17% reduction in waste is equal to 16,625 tons. Multiplying 16,625 tons by \$25/ton for landfill disposal = \$415,625

**Multiple benefits anticipated (in addition to greenhouse gas reductions)**

- Reduced litter through the provision of carts.
- Economic Sustainability - PAYT is an effective tool for communities struggling to cope with soaring municipal solid waste management expenses. Well-designed programs generate the revenues communities need to cover their solid waste costs, including the costs of such complementary programs as recycling and composting.<sup>3</sup>
- Equity - One of the most important advantages of a variable-rate program may be its inherent fairness. When the cost of managing trash is hidden in taxes, residents who recycle and prevent waste subsidize their neighbors' wastefulness. Under PAYT, residents pay only for what they throw away.<sup>6</sup>
- Reduced worker injury.

**Timeline for implementation**

The following timeline is based on USEPA's Pay-as-you-Throw toolkit.

30 months prior to implementation

Study PAYT - set goals  
Present program to mayor and council  
Develop implementation plan and timeline

24 months prior to implementation

Form task force, including community civic groups, collection crews, mayor's office  
Begin planning public outreach and education effort  
Determine data collection/program monitoring needs; design collection and reporting procedures.  
Compare container options, make final container selection  
Create rate structure design group including managers and municipal accounting or finance personnel

Climate Protection Waste Task Team - Pay-As-You-Throw (continued)18 months prior to implementation

Report on initial findings of rate structure and any equipment and staffing needs  
 Design a pilot program  
 Present initial program planning activities to task force, seek input

12 months prior to implementation

Implement pilot program; dedicate a staff member to answering residents' questions and monitoring results  
 Begin implementing community-wide public outreach: presentations to community groups, and press releases  
 Determine container specifications and issue RFP  
 Analyze need for customer service representatives (CSRs) and other administration and staffing issues  
 Review existing ordinances to decide if any changes or new ordinances are needed  
 Establish enforcement procedures for program  
 Present proposed rates for staff and task force review  
 Report to task force, seek input

6 months prior to implementation

Continue public outreach; include the program fact sheet before implementation  
 Enact new ordinances, if necessary  
 Train enforcement personnel  
 Complete training of CSRs to answer telephone questions from residents  
 Develop "error tags" collection crews can attach to any trash not in carts or over maximum weight  
 Begin receiving and processing requests for assistance from special populations

Upon Implementation

Ensure sufficient CSRs available to answer telephone questions  
 Continue close monitoring of waste amounts, recycling levels

Ongoing

Reevaluate program CSR staffing needs  
 Monitor cart inventory, obtain and sell new bags as needed to retailers  
 Continue program monitoring; issue quarterly program reports on results to mayor and council  
 Conduct annual customer service evaluation  
 Consider program adjustments as needed  
 Revise and distribute new public education materials as needed

<sup>1</sup> – Skumatz Economic Research Associates, Inc. surveys, 2005-2006

<sup>2</sup> – USEPA, [www.epa.gov/epaoserr/non-hw/payt/tools/success.htm](http://www.epa.gov/epaoserr/non-hw/payt/tools/success.htm)

<sup>3</sup> - USEPA, *Rate Structure Design – Setting Rates for a Pay-As-You-Throw Program*, January 1999.

<sup>4</sup> – [www.p2pays.org/ret/26/25193.htm](http://www.p2pays.org/ret/26/25193.htm)

<sup>5</sup> - USEPA, *Pay-as-you-throw: a cooling effect on climate change*, March 2003.

## Climate Protection Waste Task Team RecycleBank

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 8

RecycleBank uses a computerized cart system to provide financial incentives to individual households based on the amount they recycle. The amount recycled translates into RecycleBank reward points that residents use to shop at participating stores.

#### **Estimated Annual GHG Reduction**

**73,869 tons in 2012**

**Summary of specific issues** - Increasing curbside recycling rates reduces GHG emissions. One method of increasing recycling rates involves providing incentives to residents to recycle more materials. Pennsylvania based, RecycleBank developed an incentive program that has produced dramatic increases in curbside recycling rates in adopted communities. RecycleBank uses a computerized cart system to provide financial incentives to individual households based on the amount they recycled. Recycling containers have a RFID (radio-frequency identification) chip identified by a scale on the recycling truck. The amount recycled translates into RecycleBank reward points that residents use to shop at participating stores.

Participating households can earn as much as 35 “RecycleBank dollars” per month, which they redeem at over 400 local and national retail stores, including Starbucks, Staples, Whole Foods, and Home Depot. RecycleBank participants can check their online recycling account ([www.recyclebank.com](http://www.recyclebank.com)) or call a hotline number to select their reward and learn the direct environmental benefits, including how many trees and gallons of oil their recycling efforts have helped to conserve.

Increasing recycling rates decreases the cost of waste disposal and increases revenue to the City of Cincinnati. Two communities of different income levels implemented RecycleBank in Philadelphia and both achieved a 90% participation rate and an average collection of 25 pounds per week per household of recyclables.

**Strategy/action plan** - The City of Cincinnati Public Services Department would need to work with RecycleBank and a contracted recycling hauler to determine the feasibility of collection in this area and work out specifics in cost.

**Estimated greenhouse gas reduction to be achieved** - RecycleBank projects Cincinnati could collect 20 pounds of recyclables per household per week. Based on results in other cities, Cincinnati could conservatively see participation increase to 75% or 78,750 households. These increases would result in a diversion of 40,950 tons per year, resulting in a 37.76% diversion rate. This would decrease Cincinnati’s landfill disposal by 30,099 tons per year. According to the EPA WARM Model, this would result in an additional 73,869 tons of CO<sub>2</sub> reduction in greenhouse gas emissions.

**Implementation responsibilities/assignments** - The City of Cincinnati Public Services Department would need to work with RecycleBank to negotiate the cost of the program and the feasibility of implementation.

**Cost to implement/net savings from implementation** - The cost of implementing RecycleBank in Cincinnati would vary depending on Cincinnati’s investment in carts and scale technology, which are both major investments. Cincinnati could choose to negotiate the cost of the recycling carts and scale technology with an outside business or work directly with RecycleBank. Recycling carts cost approximately \$46 a piece, making the cart investment for 105,000 households \$4,830,000 or for the

Climate Protection Waste Task Team – RecycleBank (continued)

78,750 households \$3,622,500. Retrofitting a recycling truck with the scale technology costs approximately \$35,000 for each truck. Currently, Rumpke Recycling uses 25 trucks to collect from Cincinnati residents. This cost does not include the actual cost to collect the material, which is currently under contract with Rumpke Recycling. The City could also contract with a private hauler to assume the cost of recycling carts. See the Recycling Carts Waste Recommendation for more details.

RecycleBank may work with the City of Cincinnati to earn their operating revenue based on the amount of landfill diversion the program achieves instead of the roughly \$0.50 per household administrative fee. In this case, RecycleBank would receive a percentage of the disposal savings. Cincinnati would see a significant savings on their trash disposal. Diverting 30,099 tons of waste from the landfill would save approximately \$752,475 (\$25 per ton) in waste tipping fees annually. In addition, the city would receive a dramatic increase in their revenue sharing from the sale of recyclable materials. This benefit would vary depending on the current market value for recyclables. Cincinnati would also see an increase in the amount of money they received through Hamilton County's Residential Recycling Incentive program.

**Multiple benefits anticipated (in addition to greenhouse gas reductions)**

- Reduced worker injury using semi-automated system
- Increased recycling conserves natural resources
- Increased recycling saves energy
- Increased recycling reduces air and water pollution
- Increased recycling creates jobs and benefits local economy
- RecycleBank provides savings to residents when making purchases
- RecycleBank gives local businesses opportunity for advertising

**Timeline for implementation -**

**12 months before implementation-** Decide which method of cart purchase City will implement- contracting cart service out or purchasing carts on own. Phase in approach may be necessary. See Recycling Cart Waste Recommendation for more detailed information. Negotiate with Recycle Bank to determine how the administration fee will be paid for, either through waste reduction revenue sharing or monthly cost per household.

**3 months before implementation-** Plan education campaign. Work with recycling hauler to organize routes and tracking information details.

**1 month before implementation-implementation-** Launch education campaign and media outreach. Deliver carts. Train customer service personnel for questions.

## Appendix V

### Land Use Task Team Recommendations

## Climate Protection Land Use Task Team Green Construction Practices

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 1-A

Develop a Comprehensive “Best Practices” Guideline for Contractors Working in the Cincinnati Construction Industry

#### Estimated Annual GHG Reduction

Not Immediately Quantifiable

**Summary of specific issues** – For Climate Protection and maintenance of a healthy environment it will be helpful to limit GHG emissions. This can be achieved by reducing transportation distances of raw and finished materials, workers and construction tools and manufacturing and construction energy usage requirements. Decreasing the construction process footprint results in less usage of resources and waste

- Develop education programs for Construction Industry participants
- Provide incentives for recycling a high percentage of demolition and construction waste
- Provide incentives for use of locally sourced and manufactured materials
- Provide incentives for reduced energy consumption in the construction process and in all building elements
- Provide incentives for increased use of xeroscape materials
- Provide incentives for sustainable construction methods and building elements

**Strategy/action plan** – Develop an education program for the Construction Industry of “best practices.” Provide a shopping list of high-performance/energy efficient practices and a set of incentives/disincentives to encourage adoption of best practices.

**Estimated greenhouse gas reduction to be achieved** – Not immediately quantifiable. Categories of savings would include:

- Reduced energy usage
- Reduced consumption of materials
- Increase in natural filtration and absorption plant materials

**Implementation responsibilities/assignments** – Cincinnati Building Department, Planning and Zoning and Environmental Departments, in cooperation with the USGBC, organizations representing developers and builders, and labor organizations representing the building trades.

**Cost to implement/net savings from implementation** – Not immediately quantifiable.

#### **Multiple benefits anticipated (in addition to greenhouse gas reductions)**

- Energy and Resource conservation

#### **Timeline for implementation**

- Form workgroup – June 2008
- Design Program – July – December 2008
- Begin Implementation – Early 2009

## Climate Protection Land Use Task Team Green Development Regulations

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 1-B

Land Use Control and Planning Techniques for Greening Cincinnati.

#### Estimated Annual GHG Reduction

**TBD**

**Summary of specific issues** – According to the US Green Building Council (USGBC) buildings use as much as 39% of the nation’s CO<sub>2</sub> in construction and operation. It is possible with existing technology for buildings to be carbon-neutral . The actual GHG reductions of “Greening” Cincinnati’s built environment would fall somewhere between 0% and 39%.

Cities do not generally direct building owners and developers at the individual building level. Instead they employ a set of tools – regulations, proscriptions and incentives – over larger areas, from the whole city down to sub-neighborhood, individual blocks and street-frontages, and sometimes a little smaller. Many of these tools in Cincinnati, developed as they have been over the past 70 or 80 years, are out of synch with efforts to reduce the GHG impacts of building operation and development.

Examples on the negative side of this include subdivision regulations that force low-density development; zoning that discourages mixed-use, and thus walkable, developments; and parking requirements that require huge paved areas and encourage single-occupant car use. The City even passed a “weed ordinance” that may complicate or even forbid the installation of rain gardens and native plant gardens. Standardized building codes which can discourage innovative building processes and designs are yet another set of stumbling blocks. Revision of these codes and regulations will be necessary for Cincinnati to achieve it’s green potential.

**Strategy/action plan** –Cincinnati has the advantage of being a fairly large city that achieved much of its extent before the advent of the automobile. This gives it the starting point of a certain overall density. It has many areas that are truly walkable and already come very close to allowing a car-free life. Furthermore, it is historically centered around over 50 fairly distinct neighborhoods, a large number with decent neighborhood business districts.

These neighborhoods are represented by 52 community councils. This fact is one of the major and distinctly-urban positive features of Cincinnati. It could be a leverage point for making the city more urban, more walkable, and reducing the GHG load of new as well as existing buildings.

Cincinnati should get the community councils involved as advocates and promoters of green building standards and practices. The community councils are certainly closer to the level of the developer, and it’s their constituents who will live most intimately with the results. Looked at another way: why work toward New Urbanism, when you still have a lot of Original Urbanism?

The first mechanism to get the community councils involved would be an incentive program built around an adaptation of the US Green Building Council’s (USGBC’s) proposed LEED for Neighborhood Development (LEED-ND) standard. (The LEED-ND standard is geared towards new development which is why an adaptation would be necessary). The City would develop an incentive program for each community council to evaluate itself by this standard. Part of the City’s funding of the council – or perhaps some bonus funding – could be contingent on completing this baseline evaluation. A Neighborhood Quality Review Overlay could then be placed on the neighborhood, requiring at least presentation to the community council, and approval (triggered by the building permit application) according to a project’s affect on the neighborhood’s Baseline level.

Table 1 is a preliminary assessment of the Clifton neighborhood, and shows it very nearly qualifying for LEED Gold.

**Table 1**



**LEED for Neighborhood Development Pilot  
Project Checklist**

Project Name:

Yes	?	No			
			<b>23</b>	<b>Smart Location &amp; Linkage</b>	<b>30 Points Possible</b>
Y			Prereq 1	Smart Location	Required
Y			Prereq 2	Proximity to Water and Wastewater Infrastructure	Required
Y			Prereq 3	Imperiled Species and Ecological Communities	Required
Y			Prereq 4	Wetland and Water Body Conservation	Required
Y			Prereq 5	Farmland Conservation	Required
Y			Prereq 6	Floodplain Avoidance	Required
			Credit 1	Brownfield Redevelopment	2
			Credit 2	High Priority Brownfields Redevelopment	1
			Credit 3	Preferred Location	10
			Credit 4	Reduced Automobile Dependence	8
			Credit 5	Bicycle Network	1
			Credit 6	Housing and Jobs Proximity	3
			Credit 7	School Proximity	1
			Credit 8	Steep Slope Protection	1
			Credit 9	Site Design for Habitat or Wetlands Conservation	1
			Credit 10	Restoration of Habitat or Wetlands	1
			Credit 11	Conservation Management of Habitat or Wetlands	1
			<b>35</b>	<b>Neighborhood Pattern &amp; Design</b>	<b>39 Points Possible</b>
Y			Prereq 1	Open Community	Required
Y			Prereq 2	Compact Development	Required
			Credit 1	Compact Development	7
			Credit 2	Diversity of Uses	4
			Credit 3	Diversity of Housing Types	3
			Credit 4	Affordable Rental Housing	2
			Credit 5	Affordable For-Sale Housing	2
			Credit 6	Reduced Parking Footprint	2
			Credit 7	Walkable Streets	8
			Credit 8	Street Network	2
			Credit 9	Transit Facilities	1
			Credit 10	Transportation Demand Management	2
			Credit 11	Access to Surrounding Vicinity	1
			Credit 12	Access to Public Spaces	1
			Credit 13	Access to Active Public Spaces	1
			Credit 14	Universal Accessibility	1
			Credit 15	Community Outreach and Involvement	1
			Credit 16	Local Food Production	1
				<b>Green Construction &amp; Technology</b>	<b>31 Points Possible</b>
Y			Prereq 1	Construction Activity Pollution Prevention	Required
			Credit 1	LEED Certified Green Buildings	3
			Credit 2	Energy Efficiency in Buildings	3
			Credit 3	Reduced Water Use	3
			Credit 4	Building Reuse and Adaptive Reuse	2
			Credit 5	Reuse of Historic Buildings	1
			Credit 6	Minimize Site Disturbance through Site Design	1
			Credit 7	Minimize Site Disturbance during Construction	1
			Credit 8	Contaminant Reduction in Brownfields Remediation	1
			Credit 9	Stormwater Management	5
			Credit 10	Heat Island Reduction	1
			Credit 11	Solar Orientation	1
			Credit 12	On-Site Energy Generation	1
			Credit 13	On-Site Renewable Energy Sources	1
			Credit 14	District Heating & Cooling	1
			Credit 15	Infrastructure Energy Efficiency	1
			Credit 16	Wastewater Management	1
			Credit 17	Recycled Content for Infrastructure	1
			Credit 18	Construction Waste Management	1
			Credit 19	Comprehensive Waste Management	1
			Credit 20	Light Pollution Reduction	1
				<b>Innovation &amp; Design Process</b>	<b>6 Points</b>
			Credit 1.1	Innovation in Design Provide Specific Title	1
			Credit 1.2	Innovation in Design Provide Specific Title	1
			Credit 1.3	Innovation in Design Provide Specific Title	1
			Credit 1.4	Innovation in Design Provide Specific Title	1
			Credit 1.5	Innovation in Design Provide Specific Title	1
			Credit 2	LEED® Accredited Professional	1
			<b>58</b>	<b>Project Totals (pre-certification estimates)</b>	<b>106 Points</b>
Certified: 40-49 points, Silver: 50-59 points, Gold: 60-79 points, Platinum: 80-106 points					



Climate Protection Land Use Task Team -Green Construction Practices Recommendation 1-B  
(continued)

Few would think it very fair to reward communities for higher baseline levels (Clifton might be a notable exception). However, the community council would receive further incentives for raising the level, and penalties for lowering the level, whether through its own efforts or from new development. LEED certification of a project building would result in at least one additional point for the community.

The second mechanism would be to allow variances from any underlying regulations for buildings within the Neighborhood Quality Review Overlay. These variances would still require approval on a case-by-case basis, but would not be constrained by the underlying zoning, building or subdivision regulations.

One final barrier to green development that the City could remove is in the area of parking requirements. Within a Neighborhood Quality Review Overlay district, the standard could be one of plausibility. That is, no project within the district would be held to the underlying parking ratios, but could propose any plan that could plausibly service building occupants without displacing district incumbents' parking.

**Estimated greenhouse gas reduction to be achieved** –Not Immediately Quantifiable. This recommendation hinges on a Pilot Program of USGBC. Once data starts to come back from the Pilot Program, more accurate numbers will be available. Given the proportion of GHG contributed by the built environment, the benefits are expected to be significant.

**Implementation responsibilities/assignments** – City Planning Department should lead implementation of this recommendation, and should assemble a team including the Planning Commission and Community Councils to help develop program specifics.

**Cost to implement/net savings from implementation** – Not immediately quantifiable. The costs would include staff time for technical assistance and reviews, and costs for the incentive program.

The reduction in parking – often provided at City expense, whether in TIF-funded parking garages or on-street – could provide significant cost off-sets.

The higher densities the proposal would encourage would provide significant benefits in terms of public transportation, safety service provision, utilities and almost all City services, due to shorter travel distances.

Finally, as this proposal could result in active re-urbanization, the City may find itself with a much improved tax base.

**Multiple benefits anticipated (in addition to greenhouse gas reductions)** – This program could be extremely powerful, as it capitalizes on advantages of the City as a city.

Re-urbanization: New neighborhood and neighborhood business district vitality would result from community councils' incentives to develop themselves. Any participating neighborhood could expect improved liveability.

Transportation: While this proposal might initially result in higher automobile traffic volumes in certain areas, the increased density would support and encourage improved public transportation.

Climate Protection Land Use Task Team -Green Construction Practices Recommendation 1-B  
(continued)

Walkability: This proposal would result in more walkable neighborhoods. More walking means less car travel, as well as improved interrelations among neighborhood residents.

Service efficiency: As mentioned in the previous section.

Cincinnati as Exemplar: The publicity benefits of this proposal could be great. There really does seem to be a shift in public sentiment towards reducing GHG. This is certainly true among the sought-after Creative Class.

**Timeline for implementation –**

- Form workgroup – June 2008
- Design Program – July – December 2008
- Begin Implementation – Early 2009

## Climate Protection Land Use Task Team Forest Carbon Sequestration

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 2

#### Reforestation Project

#### **Estimated Gross Annual GHG Reduction      Emission Reductions 1596 in 2012; 3192 tons in 2028**

**Summary of specific issues** – Forests play a critical role in climate change by sequestering carbon as they grow. Urban trees provide an additional benefit by shading windows and air conditioners and providing carbon avoidance. Trees provide additional benefits in stormwater management, community stabilization, and removal of airborne pollutants.

**Strategy/action plan** – The Park Board has developed reforestation plans for 20 communities that do not meet national tree canopy standards and a replacement strategy for the remaining 30 communities. Plan implementation would result in 12,000 new trees within the city. A CBD Parking Lot Enhancement Study suggests that 1,300 trees could be planted in parking lots. An additional estimate of 5,000 trees could be planted along the I-75 corridor during the widening project. A tree preservation ordinance could protect up to 4 acres of trees lost each year during development.

**Estimated greenhouse gas reduction to be achieved** – Estimated GHG reductions are provided in a range that comes from 2 different formulas:

- a) 288 tons/yr is based on a simple number of 48lbs/yr x 12,000 trees
- b) 516 tons/yr is based on an average tree number provided by CITY green calculations. CITYgreen estimates the amount of pollution being deposited in an area based on pollution data from the nearest city (we used Indianapolis base data) then estimates the removal rate based on the area of forest canopy coverage on the site.
- c) CITYgreen was also used to model energy savings for 2 city blocks. The average tree (trees on the north side of properties contribute no savings) saves the average property owner 473.8 kwh/year at 20 years. Coal fired power plants generate .575lbs carbon /kwh. 473.8kwh x .575lbs x 12,000 trees = 1,634.6 tons/yr.
- d) An additional 5000 trees could be planted as part of the I-75 widening project with a carbon storage rate of between 120 and 215 tons/yr. These are not included in the above benefit total.
- e) 1,380 trees could be planted in CBD parking lots. These would remove 33.12 tons/yr.
- f) Preserving 4 acres of trees/yr at 285,000 lbs/acre = 600 tons/yr.

City Emission Reductions:  $(288+516+1635) = 2,439$  (1/2 by 2012)

Community Emission Reductions:  $(288+516+120+33+600) = 3192$  (1/2 by 2012)

**Implementation responsibilities/assignments** – The Park Board is responsible for implementing the street tree and Fall Re-Leaf planting programs necessary for the implementation. The I-75 widening project is the joint responsibility of the Ohio Department of Transportation and the City of Cincinnati.

**Cost to implement/net savings from implementation** – The cost justification for

- |                              |                       |
|------------------------------|-----------------------|
| a. plant 5,000 street trees  | @ \$200 = \$1,000,000 |
| b. plant 7,000 ReLeaf trees  | @ \$30 = \$ 210,000   |
| c. plant 5,000 highway trees | @ \$250 = \$1,250,000 |

Climate Protection Land Use Task Team - Forest Carbon Sequestration Recommendation 2-A (continued)

**Multiple benefits anticipated (in addition to greenhouse gas reductions)** – Stormwater management, property value increase, energy savings, wildlife benefits, aesthetically pleasing communities, pollution removal, and erosion control will occur as a result of implementing the action item.

**Timeline for implementation** – The Park Board’s reforestation plan is a 20 year plan that will be completed in 2024. The plan can be implemented more quickly with additional funding. The highway plantings, if funded, will occur by 2015.

## Climate Protection Land Use Task Team Sustainable Community Agriculture

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 3

To expand the community gardening program

#### **Estimated Gross Annual GHG Reduction**

**Not immediately quantifiable**

**Summary of specific issues**—There are numerous vacant and underutilized commercial and industrial properties in Cincinnati. In attempting to address this problem through the expansion of community gardens, i.e. implementing “urban agriculture,” several other redeeming benefits emerge. According to the American Community Gardening Association (ACGA), “community gardening improves people’s quality of life by providing a catalyst for neighborhood and community development, stimulating social interaction, encouraging self-reliance, beautifying neighborhoods, producing nutritious food, reducing family food budgets, conserving resources and creating opportunities for recreation, exercise, therapy and education.”

In thinking of long-term goals, there is definite room for profit based agricultural businesses within the city that would encourage residents and businesses to buy locally from city or neighborhood markets, ultimately reducing CO<sub>2</sub> by having less produce imported into the city, as well as the creation of good jobs.

In focusing on the reduction of waste, and sustainable agricultural methods, expanding backyard composting is an appealing option. The Civic Garden Center of Greater Cincinnati and the Hamilton County Department of Environmental Services collaborate to provide three weeks of intensive training on every aspect of composting, which is free to community residents. This is key to addressing the fact that many people never look at composting as a viable alternative they can implement in their own backyard.

**Strategy/action plan**—To ensure that these gardens have sustainability within the community we should start with one central garden and use it as a model for more to come. There are currently 47 various gardens within the city. However, none really have the “profit model” that is desired. A central “Cincinnati Farm” would have the ability to test out varying sustainable agricultural methods, serve as an educational hub (job training or in association with the Cincinnati Public Schools), build relationships with local restaurants to sell the produce, as well as provide low-cost healthy options to residents of the community.

**Estimated greenhouse gas reduction to be achieved—not immediately quantifiable** -Any sort of “green-space” will ultimately lower greenhouse gases. Also, when we grow and sell locally, we are cutting down on emissions by reducing the number of trucks that bring in imported produce. Furthermore, residents will be able to start walking to neighborhood markets to buy affordable, locally grown produce, as opposed to driving to a grocery store.

**Implementation responsibilities/assignments**—City and County support is important to build popularity and appeal to residents, as well as provide space. There must be a few hired staff to direct the project, and through the creation of internships and committed volunteers the labor aspect of it will hopefully take care of itself.

**Cost to implement/net savings from implementation**-- The exact figure is unknown. However, there will be a seemingly large start-up cost, which through various grants and local underwriting could be covered. The whole idea is that this central garden will be able to sustain itself, as it is based on a for-profit model.

Climate Protection Land Use Task Team - Sustainable Community Agriculture (continued)

**Timeline for implementation**—Unknown. The idea of utilizing the Winton Hills/Wooden Shoe Hollow area was mentioned. There will need to be a great deal of environmental assessments, building of green houses (hopefully out of recycled material), etc. This will most likely be complicated, time-consuming, and expensive.

## Climate Protection Land Use Task Team Implement Industrial BMPs

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 4

Implement Industrial “Best Management Practices.”

#### Estimated Gross Annual GHG Reduction

Unknown

**Summary of specific issues** – Certain industry sectors have activities that can contribute substantially to emissions of GHGs, and practices vary substantially within the industry sector in terms of how effectively those emissions are minimized. An organized effort to identify best practices by industry sector, and encourage businesses within that sector to adopt the BMPs, can significantly reduce industrial GHG emissions.

**Strategy/action plan** – Examples of sectors that might be addressed include: auto body shops; commercial construction operations; dry cleaning operations; electroplating operations; metal operations; paint and coating manufacturing and operations; paint and coating stripping operations; wood furniture operations; pesticide application; laboratory hood waste; etc.

To address these sectors, the following process might be followed:

1. Identify a sector/activity with significant GHG emissions and a significant number of local sector members.
2. Contact the sector members and form a sector workgroup.
3. Identify sector BMPs (by identifying a local facility that models best practices, or using information from trade associations, industry groups, or governmental agencies (EPA, DOE, etc.)
4. Encourage the adoption of BMPs through workshops, presentations, site tours, information sharing, etc.

Outreach to industrial facilities may not emphasize the climate protection advantages of the proposed BMPs. Activities that reduce GHG emissions typically save energy, obtain higher product yields for the same raw material inputs, use less toxic ingredients, and reduce cost. These advantages may be more compelling to certain industrial facilities.

**Estimated greenhouse gas reduction to be achieved** –The industrial sector in Cincinnati currently contributes 1.7 million tons/year of GHG emissions. If 20% of industrial facilities become involved in GHG reduction efforts, and those facilities reduce their emissions by 2% per year, emissions will be reduced by 27,200 tons in 2012, and 136,000 tons in 2028.

**Implementation responsibilities/assignments** – Implementation should be led by the Cincinnati USA Regional Chamber of Commerce. Partners may include local chapters of industrial or trade organizations, major local industrial facilities, and labor organizations representing industrial workers. Organizations offering technical resources, such as TechSolve and local colleges, should also be utilized.

**Cost to implement/net savings from implementation** –While not exactly analogous, Kansas City has an Environmental Excellence Business Network which brings environmentally minded businesses together to promote environmental BMPs to Kansas City area businesses. EEBN functions with an annual budget of \$30,000, which covers a part time staff person plus supplies and materials. Member businesses donate the time of employees to participate in planning and delivering programs. A similar effort, with a full time staff person, could operate for about \$60,000/year.

Climate Protection Land Use Task Team - Implement Industrial BMPs (continued)

**Multiple benefits anticipated (in addition to greenhouse gas reductions)** – Participating businesses would become more efficient in their use of resources, and therefore more cost competitive. This project could play a significant role in building a green reputation for Cincinnati, which would help the region attract new employers and employees.

**Timeline for implementation** – Program could be developed in 2008, and implemented beginning in 2009.



## Climate Protection Land Use Task Team Environmental Literacy and Environmental Justice

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 5

Programs should be implemented to improve environmental literacy of Cincinnati residents, especially in disadvantaged communities.

#### Estimated Gross Annual GHG Reduction

Not immediately quantifiable

Two specific projects are proposed:

1. To showcase Oyler School (in conjunction with Cincinnati State Technical College and Lower Price Hill Community School) as a downtown Center of Environmental Learning and Green Jobs Training.
2. To showcase Laughing Brook wetland, public art, sustainable design and environmental education project as a demonstration site for land use practices and stormwater management along lower Mill Creek.

**Summary of specific issue** – When people see real world examples of sustainable design and construction, they often come away with a dramatic new vision for how they can incorporate sustainability into their own lives. These lessons are especially valuable in Cincinnati's disadvantaged communities, where residents are likely to have little prior exposure to the advantages of sustainability.

Environmental education is a long-term project, but since sustainability is the key criteria for evaluating our Climate Protection strategies, developing environmental literacy represents one of the most valuable investments in the climate protection plan. Environmental education provides current residents and future generations with the skills, knowledge, and motivation needed to maintain active stewardship of our environmental systems. **Land-use practices** - There are a number of urban land-use initiatives near downtown Cincinnati that are currently in the planning stages. The following projects provide excellent opportunities to not only green Cincinnati, but also to educate our residents on the benefits of sustainability.

- Lower Price Hill Urban Design Plan (MetroWest) adopted by the City in 2003. Demolition begins in Spring 2008. This \$25 million project will renew approximately 18 acres of contaminated, underutilized industrial land in Lower Price Hill into a 250,000 square foot development featuring 4 or more LEED buildings and creating more than 400 new jobs.
- Oyler K-12 Schools, located in the heart of Lower Price Hill will be renovated to LEED Silver by the Cincinnati Public School System. The school will go into design phase in Spring 2008. The structure will support a vegetative roof. The goal of CPS is to have the lessons of sustainable design, environmental preservation, and resource management incorporated as part of the core curriculum. Working with nonprofits, CPS will create a course of study around 10 sustainable design themes.
- MSD, under a Consent Decree, will be spending billions of dollars on greening the city's infrastructure, particularly within the downstream Mill Creek Watershed. Wald Vogel Viaduct/River Road is slated for reconstruction in 2010, promising to open up a pedestrian-friendly street design and re-routing of railroad tracks and offering the possibility of a parkland connection between the LPH Community and the Ohio riverfront, a long-term goal of the Mill Creek Watershed Greenway Master Plan.

Climate Protection Land use Task Team - Environmental Literacy and Environmental Justice (continued)

- The Mill Creek Restoration Project is collaborating with the City of Cincinnati through its Mill Creek Greenway Program and with other public/ private partners to implement the Mill Creek Greenway Master Plan. The greenway program is dedicated to making improvements in the watershed and especially along the river and its tributary streams. Benefits will include cleaner water, improved air quality and floodplain management, public access to the river, new multi-purpose trails and other recreational opportunities, increased property values and economic reinvestment, reduce streambank erosion, and improved wildlife habitat. The Mill Creek Greenway program is designed to support the revitalization of neighborhoods and communities that share the Mill Creek's watershed.

**Strategy/action plan**

**Project 1:** To ensure that our Climate Protection initiatives are sustainable over the long term, the Land-Use Team is suggesting that we showcase Oyler School (in conjunction with Cincinnati State Technical College and the Lower Price Hill Community School) as a model green Community Learning Center, the educational hub of a healthy, productive, and economically sustainable urban residential neighborhood. As a new High Performance School, Oyler would demonstrate the benefits of "going green" such as reduction in energy costs and dramatic boosts in student achievement. Oyler would serve as an Environmental Studies Center for both youth and adults, offering a special focus on career training to prepare students for jobs in renewable energy, energy efficiency upgrades, site remediation, stormwater management, etc.

CPS is planning a large investment in the community as Oyler is renovated. This is an opportune time to ensure that the environment around the school is as healthy as possible, and that students participate in in-service learning, such as: monitoring of air emissions, CSOs and SSOs; planting trees; planning bike routes to school; etc. Within the setting of the nearby Green Industrial Park (MetroWest), local industries can partner with the school to help in curriculum building, monitoring environmental compliance, vocational projects, onsite training and job fairs, opening pathways to entry jobs in the new emerging green industry.

**Project 2.** To promote environmental literacy with respect to ecological land-use, we are proposing to complete installation – and educational use -- of the **Laughing Brook** wetland, public art, sustainable design and environmental education project. Laughing Brook is one component of the City of Cincinnati's Mill Creek Greenway Program. The project is located along Mill Creek, inside Salway Park, across the street from the Spring Grove Cemetery in the Spring Grove Village neighborhood.

This project offers exciting lessons in green infrastructure approaches to stormwater management and incorporates sustainability principles and practices, including use of solar power, natural materials, and reused/ recycled materials and furnishings. The green infrastructure strategies demonstrated at Laughing Brook include the wetland itself, pathways made from porous concrete and asphalt and from pervious pavers; a bio-filtration trench; a bio-swale to filter and slow down discharges to Mill Creek; and a large underground water storage tank that allows circulation and reuse of stormwater in the wetland during prolonged dry weather.

Climate Protection Land use Task Team - Environmental Literacy and Environmental Justice (continued)

Illustrating the vital connection between people and the Earth, the functioning wetland includes bio-sculptures of human hands that transform into Ohio native fish. The sculpture and constructed wetland will be a functioning water filtration system. The sculptures are covered with mosses that will work with rock layers and wetland plants to filter and cleanse storm water runoff from the main parking lot and the adjacent ball field before it is discharged to Mill Creek.

Students from CPS schools are participating in the installation and maintenance of native vegetation inside and around the wetland. They have experienced hands-on important lessons in environmental sustainability, and this will contribute to a lifelong understanding of the dynamics of the earth's ecosystems.

**Estimated greenhouse gas reduction to be achieved -- – not immediately quantifiable.**

Once students and residents understand and experience the benefits and savings that can be achieved through sustainable technologies, bioengineering, air quality control, renewable energy systems, indoor daylighting, solar thermal heating, photovoltaic systems, green roofs, water gardens, pervious cement parking lots, solar electric charging stations for electric vehicles, recycling, and biking to school, the reductions in GHGs will be significant. Historically, schools were designed simply as functional spaces to meet traditional educational needs. There is an increasing awareness that the building itself can be a tool to teach eco-awareness. By implementing green solutions into the built environment of the classroom and teaching students to monitor electric, water, solar usages, and air quality compliance, students can witness firsthand how actions at a local level can make a difference in their environment and dramatically reduce CO<sub>2</sub> emissions in their neighborhood.

**Implementation responsibilities/assignments** – Implementation will be led by the Growing Green & Healthy Schools Network of Cincinnati (Growing Green). Currently, Growing Green is engaged in bringing City Council, community councils, neighborhoods, businesses, the health community and environmental organizations to the same table so that together they can work to “re-green” Lower Price Hill, improve air, land, and water quality, and help reduce drug-related crime, a major priority for the neighborhood.

**Cost to implement/net savings from implementation** – Not immediately available.

**Multiple benefits anticipated (in addition to greenhouse gas reductions)** –According to national studies, positive contact with the natural world and increased physical activity can significantly reduce symptoms of attention-deficit disorder and obesity. Improvement in indoor air quality and indoor daylighting will help to make children smarter, healthier and happier. It has been shown that children who experience diverse natural settings, green areas around their school, and riverfront and park access are more physically active, more aware of nutrition, more civil to one another and more creative. (Bell and Dymont, 2006). Schools that use nature-based experiential education produce significant student gains in social studies, science, language arts, and math. (American Institutes for Research, 2005).

**Timeline for implementation** – The proposed changes will begin to impact the urban neighborhood within the next 5 years, radically changing the community for generations to come.

**Climate Protection Land Use Task Team  
Incentives to Promote Mixed Use Development Patterns**

**TASK TEAM WORK GROUP RECOMMENDATIONS****Recommendation # 6A**

Enhance the density and interconnectedness between land uses in the City

**Estimated Gross Annual GHG Reduction****Not immediately quantifiable**

**Summary of Specific Issues** - Land use, and how space is organized and used in a city has a significant impact on how much greenhouse gas is emitted in an area. Communities that are densely built with housing, employment and shopping locations all in close proximity, where people have choices other than driving to get to where they way to go, emit much less greenhouse gas than places developed in a low-density way where uses are isolated and the private car is the only way to get around. The primary reason for the significant difference between these two kinds of areas is the increase in driving a person does in the low-density community v. the dense, mixed use one.



*Dense urban form in Burlington, VT circa 2005.*

Dense urban forms were typical of Cincinnati's early neighborhoods, and most of the City developed before about 1940. Early development assumed people were walking or using public transit (the streetcar systems). Over time as development patterns became less dense and dependence on the private car grew development became lower density and separated uses more and more. Even our older neighborhoods lost density over time as people and businesses moved out of the core.



### Climate Protection Land use Task Team – Develop Incentives to Promote Mixed Use Development Patterns (continued)

To create and re-create the kinds of communities that are dense, mixed-use and have lots of transportation choices will be a major undertaking. Significant changes in the way public and private investments are made will be necessary. This will require unprecedented cooperation between public and private partners, as well as deliberate input and participation from citizens as a new kind of partner in the development process. In order to truly make these changes real, both regulatory changes and incentives will be necessary. Form-based zoning codes are being implemented in many communities to implement the kind of changes needed to create real land use change. Unlike conventional zoning ordinances that regulate

use, height and bulk, Form-Based codes are more prescriptive as to classes of building type and bulk, but broadly permissive as to use.

Changes to transportation and infrastructure investment priorities will also be necessary.



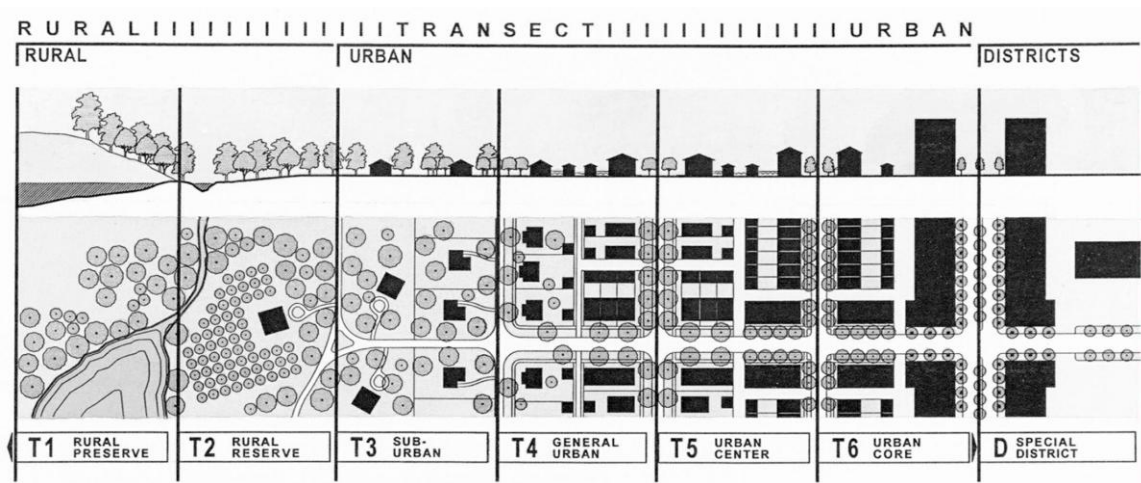
#### DEVELOP INCENTIVES TO PROMOTE MIXED USE DEVELOPMENT PATTERNS

**Strategic Action Plan** - Increasing the density and mix of uses in close proximity to one another will take a change in regulations and incentives to developers. It will also take coordination between land use and transportation improvements to ensure good connectivity. Current best practices in the area of land use regulations that produce the kinds of change we are recommending can be found in Form-Based Zoning. The City should consider instituting Form-based zoning models in neighborhoods ready to participate.



**Conduct a review of the City Zoning Code and Subdivision Regulations** to incorporate allowances for mixed uses, reductions in the parking requirements and provisions for green space and trail connectivity. Form-based zoning provides a good model for these kinds of changes being implemented across the Country.

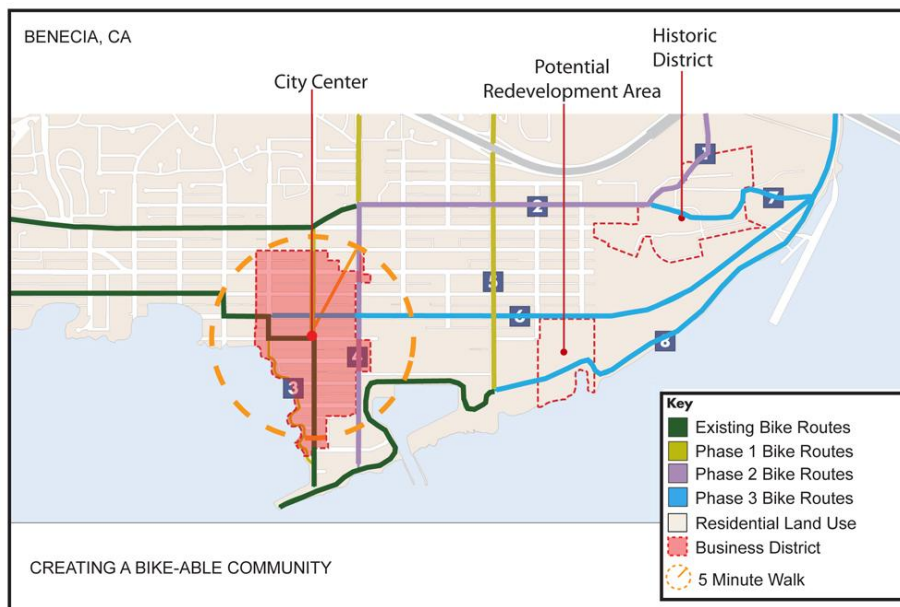
Climate Protection Land use Task Team – Develop Incentives to Promote Mixed Use Development Patterns (continued)



*In an effort to deal with sprawl and develop dense urban form "transect-based" codes are being used in tandem with conventional zoning ordinances. The transect approach encourages the creation of distinct living and working environments for each point along a continuum.*

**Create development incentives for new construction and renovation** to increase residential density in projects, and for commercial projects to locate appropriately and create the pedestrian connections that make walking and biking to those destinations possible and attractive. These incentives should also include bonuses for projects that preserve usable open space and create new community open spaces.

**Consistently review the City's transportation priorities** to ensure they are consistent with these objectives, and take advantage of transportation funding that is available for various pedestrian and trail projects.



*Example of a transportation plan in Benecia, CA designed to phase in bike routes over a 10-year period.*

Climate Protection Land Use Task Team – Incentives to Promote Mixed Use Development Patterns  
Recommendation 6-A (continued)

### Estimated Greenhouse Gas Reductions -

#### Carbon Impacts of Housing Patterns

Using ICLEI's personal CO2 emissions calculator ([www3.iclei.org/co2/co2calc.htm](http://www3.iclei.org/co2/co2calc.htm)), the following is an estimate of the CO2 emissions of a typical Cincinnati resident, a resident of a clustered mixed use development, and a resident of downtown/OTR who commutes by streetcar. Of course, the results of this exercise are heavily dependent on the inputs selected, and will vary based on the details of specific projects.

	Typical Resident	DT/OTR	Clustered Mixed Use
<b>CO<sub>2</sub>e</b>	<b>11.6 tons</b>	<b>6.1 tons</b>	<b>8.9 tons</b>
Assumptions:			
Income	\$35,000-49,000	\$35,000-49,000	\$35,000-49,000
Age	45-64	45-64	45-64
Household Size	4	4	4
Electric Usage (kWh) <sup>1</sup>	20,000	10,000	15,000
Electric Source	Fossil Fuels	Fossil Fuels	Fossil Fuels
Heating Oil	0	0	0
Natural Gas <sup>1</sup>	6000 cu. meters	3000 cu. meters	4500 cu. meters
Water	350 cu. meters	350 cu. meters	350 cu. meters
Gasoline Expense <sup>2</sup>	\$1800	\$900	\$1500
Miles Driven <sup>2</sup>	12,000	6,000	10,000
Average Car Occupancy	2	2	2
Car Type	Mid Size	Mid Size	Mid Size
Miles of Public Transit <sup>2</sup>	0	3000	1000
Miles of Air Travel	1000	1000	1000
Miles of Train Travel	0	0	0

Climate Protection Land Use Task Team – Incentives to Promote Mixed Use Development Patterns  
Recommendation 6-A (continued)

1. Assumption considers that Downtown/OTR housing and to a lesser extent new clustered mixed use housing is likely to be smaller, more energy efficient, and have reduced thermal losses due to attached construction (townhomes/apartments) compared to older, single family housing.
2. Assumption considers that Downtown/OTR residents, and to a lesser extent clustered mixed use residents will use more public transit, walk or bike to more destinations, and generally have more destinations located in close proximity to their homes.

**Implementation Roles and Responsibilities** - The Department of Planning should take the lead on the review of zoning and subdivision regulations. There should be a community process to work with neighborhoods, developers and other stakeholders on any changes. The current zoning code has recently been updated and already includes many improvements to permit more mixed uses and higher densities.

Creating and implementing an incentive program to increase density in residential and commercial projects should be coordinated between the Departments of Planning, Community Development, Economic Development, and Parks. It is possible that current programs could be modified to accomplish this objective.

A review of transportation projects should be part of the annual budget review. The Departments of Transportation, Budget, and Planning should conduct this review.

**Cost to Implement** - The review of regulations and projects are both activities that can be conducted by the current administration within the current budget. They do however represent a commitment of staff time that will take away from other work currently being done.

Creating incentives for denser housing, more compact, walkable business districts and more usable green space certainly has a budget implication. How much the City dedicates to this use is a function of its priority. The budget implications for a program that has a real impact on greenhouse gas emissions could be significant.

**Multiple Benefits** - Successfully creating the kinds of spaces described above will have positive benefits well beyond reducing green house gas emissions. These kinds of communities are healthier places to live and help reduce obesity, asthma, diabetes and many other chronic diseases associated with a sedentary lifestyle. These kinds of neighborhoods provide better habitat for urban wildlife, and reduce the amount of storm runoff the sewer system must accommodate.

**These types of neighborhoods also allow residents and commercial and institutional neighbors to reduce their expenses on transportation, and reduce the time they spend in commutes.**

**Timeline for Implementation** - All three of these recommendations could be completed in 2008. The budget implications of the incentive program may require more negotiation and may require consideration in a full budget update year.



## Climate Protection Land Use Task Team Improved Integration of Mass Transit

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 6-B

Develop plan for land use in areas immediately surrounding mass transit stations or hubs.

#### Estimated Gross Annual GHG Reduction

Not immediately quantifiable

**Summary of specific issues** – A separate task team is looking into ways of utilizing mass transit, including light rail, to reduce greenhouse gas emissions. A related topic with the potential to substantially reduce emissions is the use of land immediately surrounding mass transit stations, including light rail stations, or hubs for buses, or places where multiple bus routes intersect. Identified issues fall into two primary categories: parking options at stations outside of the city center and zoning of land surrounding stations to encourage in-commute shopping for individuals living near the station or hub and pedestrian accessible shopping for others.

With regard to parking, stations in many places use exclusively surface lots for parking, which require pavement of large amounts of land. Land could be freed up for green space or for closer (more pedestrian-friendly) access to shopping from the station site by utilizing parking garages, which may also take advantage of construction techniques that minimize absorption of heat.

With regard to land use in the areas surrounding stations and hubs, the availability of stores in walking distance of the station or hub and the parking at stations, might encourage commuters to shop during their commute rather than making separate trips by car to the grocery store, dry cleaners, or other necessities. The existence of pedestrian-accessible shopping for others, meaning stores within easy walking distance of each other (without the need to cross large parking lots or roads) would also encourage the use of mass transit as an alternative to driving and, even for those traveling by car, would encourage them to consolidate their shopping into fewer trips.

A second tier of park space and residential areas in near proximity to stations or hubs might also have the effect of drawing people to use mass transit to travel to recreational areas or to commute by mass transit, respectively.

**Strategy/action plan** – This plan may be implemented through zoning, building requirements, and dedication of public space to green space

**Estimated greenhouse gas reduction to be achieved** – Unknown

**Implementation responsibilities/assignments** – Authority overseeing mass transit; County; local zoning boards.

**Cost to implement/net savings from implementation** – Unknown

**Multiple benefits anticipated (in addition to greenhouse gas reductions)** – Potential convenience to individuals, reduced congestion.

**Timeline for implementation** – Dependent on progress of mass transit.

## Climate Protection Land Use Task Team Relax Minimum Parking Requirements

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 6-C

To reduce the parking within the city through relaxed requirements and reduce the heat island effect through shading pavement and utilizing more highly reflective paving materials.

**Estimated Gross Annual GHG Reduction**

**Not immediately quantifiable**

**Summary of specific issues –**

#### **The Problem with Too Much Parking:**

- **Free/cheap parking adds expense to residential and commercial projects and to city operations. That expense is imposed on the consumer or citizen regardless of whether or not he/she utilizes the parking.**

Free parking is a hidden government subsidy and distorts the parking “market.” Those who don’t drive nonetheless subsidize the parkers, through higher prices that are charged to everyone for goods and services. Parking requirements also raise development costs. Nonprofit developers in San Francisco have estimated that parking requirements add 20 percent to the cost of each affordable housing unit and reduce the number of units that can be built on a site, thereby reducing urban density.

- **Free/cheap parking encourages automobile use.**

Charging market-rate prices for on-street parking would bring in revenue from parkers and would discourage unnecessary automobile use.

- **Too much parking negatively impacts the density of development, forcing sprawl and detracting from the urban environment.**

Past some critical point, more parking spaces harm rather than help the central business district. They reduce compactness and proximity: the chief advantages of an urban location. Vast parking lots also create “dead” zones that repel pedestrians. Relaxing parking requirements can reduce the cost of development, especially in central cities, and help revitalize business districts. In Stuart, Florida, for example, parking requirements were eliminated. After four years, the number of downtown businesses was up 348%. With the increased tax base, the town was able to lower its tax rate.

- **Existing parking designed for peak periods is often left underutilized.**

Parking often is not used efficiently. In neighborhood business districts, owners and employees too often park in front of their stores, taking up valuable spaces and forcing customers to park elsewhere. In addition, conventional minimum parking ratios greatly exceed the actual demand in many locations. Typical office park parking requirements mandate four spaces per 1,000 square feet of space, or 1.3 sf of asphalt/sf of building area. Actual peak occupancies per 1,000 sf, however, are often much lower, ranging from a low of .94 to a high of 4.25, with an average of 2.52. Other examples include a shopping center lot built for the busiest day of the year, or a church lot sized to accommodate crowds of worshipers on Christmas and Easter.

Climate Protection Land Use Task Team – Relax Minimum Parking Requirements (continued)**How Parking Contributes To Global Warming:**

- **Parking itself is not directly responsible for greenhouse gas emissions.**
- **Parking does contribute indirectly to greenhouse gas emissions:**
  - Parking lots encourage driving, which obviously results in GHG.
  - Parking lots contribute to vast amounts of impervious pavement, which increase the stormwater runoff, taxing the wastewater treatment plants in combined systems (increasing energy demand) and reducing the moisture in the air which would serve to cool the air.
  - Pollutants deposited by cars onto parking lot pavement become more evaporative when the pavement heats up, emitting GHG into the air.
- **Aboveground parking also contributes to the heating of the local environment through what is called the Heat Island Effect**, which results from dark pavement (and rooftops) that absorb heat and light and thereby increase the heat of the surrounding air.
  - Because the air surrounding these parking lots is hotter due to the heat island effect, more energy is required to cool buildings and cars, which has an effect on GHG emissions.

**How Modifications to Parking Can Reduce GHG Emissions:**

**Reduction in parking or increased shading or reflectivity of parking surfaces will not only decrease the heat island effect significantly, but will reduce GHG emissions in the following indirect ways:**

- Fewer available parking spaces encourages use of mass transit rather than driving.
- Increased landscaping of parking areas not only reduces heat island effect, but plant-life also absorbs GHG (quantification of this would be under urban forestry).
- Reduction in heat island effect results in lower energy uses for air conditioning (buildings and vehicles).
- Reduction in impervious surface results in less stormwater runoff and cleaner stormwater runoff, which reduces the energy required at MSD treatment plants.

**Strategy/action plan*****Addressing Parking Requirements***

**Phase out parking requirements.** By revamping parking requirements, the City can let the market decide how much parking is provided, and where. Motorists will economize on parking by changing their travel behavior. Over time the result will be fewer parking lots, a higher density of development, and a shift toward mass transit, bicycling and walking, resulting in lower GHG emissions. The money saved could then be put to other uses, such as providing incentives for “green” development.

**OR**

**Revamp parking requirements.** New requirements would be tiered according to the site's proximity to transit lines with frequent service. Sites farther from transit lines would be allowed more spaces.

Climate Protection Land Use Task Team – Relax Minimum Parking Requirements (continued)

The zoning code of Portland, Oregon, a world leader in sustainable development, provides a model for this kind of parking reduction.

Climate Protection Land Use Task Team – Relax Minimum Parking Requirements (continued)

Sites that are located in close proximity to transit, have good street connectivity, and good pedestrian facilities may need little or no off-street parking. Transit-supportive plazas and bicycle parking may be substituted for some required parking on a site to encourage transit use and bicycling by employees and visitors to the site. Provision of carpool parking, and locating it close to the building entrance, will encourage carpool use.

There is no minimum parking requirement for sites located less than 500 feet from a transit street with 20-minute peak hour service. (33.266.115, “Maximum Allowed Parking Spaces”)

**Establish parking maximums.** According to the Portland zoning code, “Limiting the number of spaces allowed promotes efficient use of land, enhances urban form, encourages use of alternative modes of transportation, provides for better pedestrian movement, and protects air and water quality” (ibid.).

**Promote shared parking in mixed-use areas.** Through the zoning code, promote shared parking in mixed-use areas, used by multiple users at different times. For example, a church parking lot could be available for use by an office building or local businesses during the week, when not needed for services.

**Build strategically placed garages.** Replacing surface lots with garages is a more efficient, and ultimately more economical use of land. Parking structures could include residential and/or commercial uses that could help enliven the street. Structured parking, like shared parking, would have the additional advantage of further reducing the conversion of land to impervious cover.

**Prevent parking “spillover” into residential neighborhoods by implementing resident-only parking.** This consideration will help ensure acceptance of new parking regulations by the public.

*Addressing the Heat Island Effect*

**Increase perimeter and interior landscape requirements for parking lots of all new developments.**

**Provide incentives to encourage developers to meet LEED standards with regards to the Heat Island Effect.** The City already provides an incentive for projects to be designed and constructed per LEED requirements, and LEED points are given to projects which provide shade over their parking lots and/or utilize more highly reflective paving materials.

**Provide incentives to encourage owners of existing parking lots to improve their lots to LEED standards.** Encourage them to eliminate parking spaces for the installation of landscaping islands and/or pave their lots with more reflective paving materials during regular maintenance.

**Set aside funds to improve city-owned parking lots to LEED standards.**

Estimated greenhouse gas reduction to be achieved – not quantifiable.

Because parking lots mostly have an indirect effect on GHG, reductions in GHG emissions from changes to parking lots are not easily or accurately quantifiable.

**Implementation responsibilities/assignments** - City of Cincinnati Planning Department or City of Cincinnati Community Development Department, whichever will continue to write and enforce the zoning code.

Climate Protection Land Use Task Team – Relax Minimum Parking Requirements (continued)**Cost to implement/net savings from implementation**

Not sure how cost would be estimated. Potentially would include consultants for studies, budget for City-owned parking lot improvements, revisions to zoning code and landscape ordinance, budget for incentives, etc.

**Multiple benefits anticipated (in addition to greenhouse gas reductions) –**

- Less pavement to maintain.
- Reduced parking requirements allow for denser developments.
- Stormwater quality improved and stormwater quantity lessened. Lesser burden on storm sewer, and combined sewer systems. Lesser burdens consequently on MSD treatment plants – less energy utilized. Helps MSD to meet consent decree.
- Costs of hot pavements: Urban heat islands increase the demand for air-conditioning and thus energy use.
- Cooler air resulting from cooler pavements could affect the generation of smog – improvement to air quality
- Cooler pavements have longer lifetimes because they are not as stressed by the excessive heat
- Greens up the city providing more park-like settings rather than seas of asphalt that often are not properly maintained.

**Timeline for implementation**

- Study to determine viability of reducing/eliminating parking requirements and study to determine where existing parking spaces are underutilized and can be removed - Completed by end of third quarter 2008
- Revision of landscape ordinance to increase requirements for interior and perimeter landscaping. – Approved by end of fourth quarter 2008
- Revision of parking requirement in zoning code per results of study. – Approved by end of second quarter 2009
- Allocate additional funds for maintenance of City-owned parking lots to increase shade and utilize more reflective paving materials – 2009 Budget

## Climate Protection Land Use Task Team Create Regional Trail System

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 7

To develop a regional trail system to provide recreational as well as transportation benefits for pedestrians and bicyclists. The system would link schools, neighborhoods, business centers, transit stations, and existing park trails to the proposed Mill Creek Trail and the Ohio River Trail.

#### Estimated Annual GHG Reduction

Not Immediately Quantifiable

#### Regional Trail Connections

Americans spend tens of millions of dollars purchasing, operating and maintaining automobiles. Road and highway building and maintenance, oil production, and environmental damage add to the tab. The average car costs about \$3,000 per year to operate plus up to \$2000 a year on gasoline. Some studies indicate that 50 percent of all car excursions are less than three miles, a distance that could easily be walked or biked.

By using neighborhood trails for transportation, these commuters are saving between 5 to 22 cents per automobile mile.

An organized trail system is a desirable amenity and can contribute to the economical vitality of the community. A trail can guide both visitors and residents through diverse neighborhoods, past interesting shops, enticing restaurants, and many other businesses in downtown areas. Revenue generated from trail-related recreation and sports activities provide substantial income and employment opportunities.

#### **A Growth Industry**

Hiking and outdoor recreation is a booming business. Sales of outdoor gear, clothing, footwear, and other accessories for 2001 amounted to more than \$18 billion. In 15 years, consumer spending on recreation and entertainment has increased from 6.5 percent of total consumer spending to 10.5 percent. Since 1977, visitors to National Park units have increased by 30 percent. And in the seven years prior to 1994, the number of USDA Forest Service campsites grew by 9.2 percent to accommodate the burgeoning interest in hiking and camping. By the year 2050, the number of people backpacking is expected to increase 26 percent.

Trails are becoming common in residential neighborhoods. Development plans for homes, apartments, and townhouses often include footpaths to enhance recreational opportunities *and* property values. Urban trails are regarded by real estate agents as an amenity that helps to attract buyers and to sell property. Trails are considered lifestyle enhancements and are usually included in the sales package for a property. In a survey of metro-Denver real estate agents, 73 percent of the agents believed a home near a trail would be easier to sell. A survey of homeowners living adjacent to a trail showed 29 percent felt their property value would increase and 57 percent felt their home would sell more quickly because of the trailside location. Furthermore, 29 percent were influenced by the proximity of a trail in buying their home, and 17 percent of renters were influenced by the presence of a trail.

Studies in other regions have substantiated the Denver findings. For example, Seattle's Burke-Gilman Trail has increased the value of homes near the trail by 6.5 percent. In another study of two rail-trails in Minnesota, 87 percent of landowners surveyed believed the trails had no negative impact on the value of their property. A survey of property values near greenbelts in Boulder, Colorado, noted that housing prices declined an average of \$4.20 for each foot of distance away from a greenbelt for up to two-thirds of a mile. In one neighborhood, this figure was \$10.20 per foot. The same study concluded that the average

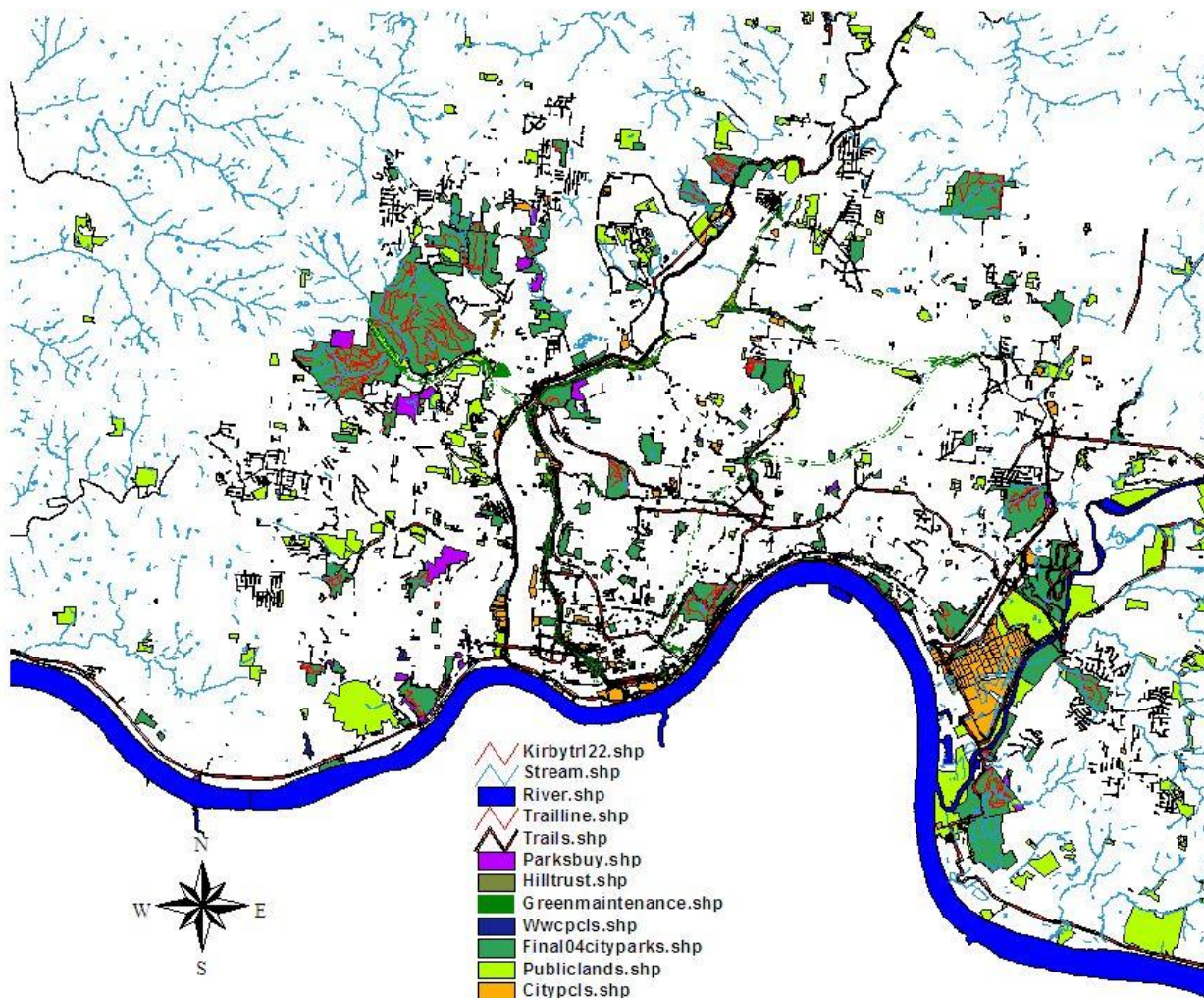


### Climate Protection Land Use Task Team - Create Regional Trail System (continued)

value of a home adjacent to the greenbelt would be 32 percent higher than the same property 3,200 feet from the greenbelt.

A trail system through Cincinnati could be a valuable development strategy if properly designed and implemented. The map below indicates existing, planned, and some potential trail corridors as well as existing bike lanes and park trails. The map needs to be merged with planned and existing transit routes, employment centers, and other features to determine the most cost effective routes for long-term success. When routes are applied to population demographics, carbon offsets can be calculated.

## Existing or Planned Trails and Bike Lanes



## Climate Protection Land Use Task Team Regional Land Use Plan (Long Term Priority)

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 8

Initially: Produce a multi-county land use plan, including a future land use map. Subsequently: 1) Support the implementation of OKI's Strategic Regional Policy Plan; and 2) Produce a comprehensive plan for the City of Cincinnati.

#### Estimated Annual GHG Reduction

#### Not Currently Quantifiable

**Summary of specific issues** - In brainstorming long-term and short-term priorities at its first meeting, the Climate Protection Task Team's Land Use Committee listed "Regional Land Use Planning" as a long-term priority. The goal of this initiative would be to establish a blueprint that would lead to more energy-efficient land development across the tri-state region.

At its second and third meetings, the Climate Protection Task Team's Land Use Committee agreed that this long-term priority should be more narrowly applied to the City of Cincinnati because the City does not have an up-to-date comprehensive plan or future land use map, and because the Ohio-Kentucky-Indiana Regional Council of Governments (OKI) had adopted a Strategic Regional Policy Plan in 2005.

Produced over a period of years, OKI's Strategic Regional Policy Plan addresses land use and five other interrelated topics (transportation, public facilities and services, natural systems, housing and economic development). The plan established a regional vision and supporting principles to alter the region's costly land development and infrastructure trends. The plan also addresses 28 strategic regional issues (the region's critical challenges or fundamental policy concerns), and includes a series of goals, objectives and policies that relate to the regional vision, the plan's six topical areas and the strategic regional issues.

At the outset of OKI's strategic planning process, a more traditional comprehensive planning approach that would include a future land use map was considered by OKI's Board of Directors. The advice of OKI staff and a steering committee was that a regional future land use map would be presumptuous of an agency with no regulatory or taxing authority, that such a map would intrude on local land use authority, and that it would be unenforceable and ineffectual.

OKI's 2005 Strategic Regional Policy Plan repeatedly encourages, among other things, better local comprehensive planning (i.e., up-to-date, complete and community-wide plans) as one means to alter the region's costly land development and infrastructure trends.

OKI is now implementing the strategic plan, in part, by asking local sponsors of proposed transportation improvement projects to demonstrate that their projects further local comprehensive plans. If a proposed project furthers a comprehensive plan, it is awarded points in OKI's transportation prioritization process. OKI is also building a toolbox of sample ordinances, comprehensive plan guidance and models that local jurisdictions across the tri-state region can use at their discretion.

**Strategy/action plan** - City Council, the Mayor and City Manager should commit to producing a comprehensive plan. The City should then assemble a planning team representing various departments and led by the Community Development and Planning Department to scope the comprehensive plan.

OKI's comprehensive plan guidance, *Elements of an Effective Local Comprehensive Plan*, should be used in the City's scoping process. The project's scope will dictate the level of effort needed to produce a community-wide plan that includes existing and future conditions maps.



Climate Protection Land Use Task Team - Regional Land Use Plan (Long Term Priority) (continued)

The overall goals of the City's comprehensive plan should be to assess existing conditions, to provide for acceptable levels of service into the future, to include measurable goals, objectives and policies that describe how the plan will be implemented, to tie the plan to a capital improvements budget, to provide for associated regulations and incentives, and to provide for periodic updates and amendments.

At a minimum, the City's comprehensive plan should address the topics of: transportation; housing; public facilities and services (including infrastructure, public and private school facilities, recreation and open space, other community facilities such as public safety facilities, and information technology); natural systems; economic development; intergovernmental coordination; capital improvements; and land use.

**Estimated greenhouse gas reduction to be** - Unknowable at this time.

**Implementation responsibilities/assignments** - Nearly all of the City's departments and divisions should support the planning process and contribute data, analyses, and policy and program suggestions. Those departments and divisions should also expect to play active roles in the plan's implementation.

**Cost to implement/net savings from implementation** - Unknown until the project is scoped, initiated and until baseline data is collected and analyzed.

**Multiple benefits anticipated (in addition to greenhouse gas reductions)** - Relatively unknown until the level of the City's commitment to this initiative is made and the project is scoped. Effective comprehensive plans address multiple interrelated topics, and implement measurable goals, objectives and policies. Benefits in intra- and intergovernmental coordination, capital budgeting, environmental enhancement/ protection and infrastructure management typically result.

**Timeline for implementation** - Unknown until the City commits to this initiative and the project is scoped. A typical comprehensive plan can take 18 months to produce. Implementation of a comprehensive plan through programs, regulations and incentives that are consistent with the plan typically takes place over a period of months or years. An associated capital improvements program typically spans five years and is rolled over annually. Comprehensive plans are usually updated every three to five years.

## Climate Protection Land Use Task Team Redevelop Brownfields

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 9

Redevelopment of Vacant and Underutilized Properties

#### Estimated Annual GHG Reduction

#### Not Immediately Quantifiable

**Summary of Specific Issues** - Vacant and underutilized commercial and industrial properties are a problem for every urban area in the country and Cincinnati is no exception. These properties, otherwise known as brownfields, have a history of real or perceived environmental contamination. Most contamination found on brownfield sites is a result of past manufacturing processes, improper material handling and disposal practices, and the presence of asbestos containing materials. Redevelopment of these sites helps stabilize and preserve the urban core of the community, provides job opportunities to area residents, increases the tax base, and reduces blight. In addition, brownfield redevelopment provides excellent opportunities for sustainable development, while limiting urban sprawl and preserving open farmland and green space.

**Strategy/Action Plan** - The City of Cincinnati's SPUR (Strategic Program for Urban Redevelopment) Team and the Port of Greater Cincinnati Development Authority have been focused on brownfield redevelopment in the Cincinnati area for several years and have had many successes to date. Both of these organizations need to continue their focus of identifying redevelopment opportunities, leveraging private investment, and obtaining grant funding to bring these projects to fruition.

**Estimated Greenhouse Gas Reduction to be Achieved** - While the greenhouse gas reductions resulting from brownfield redevelopment are not immediately quantifiable, they do have the potential to provide the following:

- For every 0.01 acres of deforestation of greenfield properties avoided, approximately 1 metric ton of CO<sub>2</sub> emissions is saved.
- For every 25.6 tree seedlings planted on a redeveloped brownfield site, approximately 1 metric ton of CO<sub>2</sub> emissions is saved.
- For every 0.23 acres of existing forest that is maintained, approximately 1 metric ton of CO<sub>2</sub> emissions is saved.
- For every 680 pounds of waste not placed in a landfill by incorporating recycling of construction and demolition materials into brownfield redevelopment, approximately 1 metric ton of CO<sub>2</sub> emissions is saved.
- For every 0.18 cars eliminated from the roadways as a result of building businesses closer to the urban population through brownfield redevelopment, approximately 1 metric ton of CO<sub>2</sub> emissions is saved.
- For every person that resides in a clustered mixed-use development instead of a suburban-style residential subdivision, approximately 2.7 metric tons of CO<sub>2</sub> emissions is saved.

#### **Implementation Responsibilities/Assignments**

Most brownfield redevelopment in the City of Cincinnati has historically been led by the City's SPUR (Strategic Program for Urban Redevelopment) Team. SPUR is an interdepartmental team made up of staff from the Community Development, Environmental Quality, Planning, Budget, Law, Real Estate, and Transportation and Engineering Departments/Divisions. Their team mission is to identify and remove real

Climate Protection Land Use Task Team – Redevelop Brownfields (continued)

or perceived barriers to development in order to return vacant, contaminated, or underutilized land to productive uses that benefit the City by creating jobs, increasing the tax base, and enhancing public health. Current SPUR activity accounts for more than 170 acres of brownfield redevelopment projects. More than 2,200 jobs are expected from just these 5 project sites. Collectively, these sites have received more than \$10 million in grant funding and over \$367 million in total private investment.

In addition to the City's SPUR Team, the Port of Greater Cincinnati Development Authority has been highly effective in its mission to redevelop brownfields throughout Hamilton County. It is imperative that they continue their mission and partner with the City's SPUR Team when it makes sense.

**Cost to Implement/Net Savings from Implementation**

In order to achieve the greatest return, the formation of public and private partnerships to implement brownfield redevelopment projects is imperative. Grant funding to assist with environmental assessments, acquisition, demolition, and remediation may be secured from the Clean Ohio Revitalization Fund (CORF), Clean Ohio Assistance Fund (COAF), Urban Land Assistance Program (ULAP), and US Environmental Protection Agency. Local governments and private investors must also contribute their fair share in order to accomplish these projects.

The 8.5-acre Factory Square brownfield redevelopment project in the Cincinnati community of Northside is a great example of a public/private partnership that will result in significant benefits to Cincinnati, including the reduction of greenhouse gas emissions. The Factory Square master plan involves adaptive reuse of two existing buildings and construction of 2 new buildings and over 30 new townhouses. This development will create 135 residential units, 40,000 square feet of commercial/retail space, and 20,000 square feet of office space. The total estimated project cost is \$27,895,030. The City provided \$2,132,030 for acquisition, environmental site assessments, and tenant relocation. \$763,000 worth of grant funding was obtained from the Clean Ohio Assistance Fund and the Hamilton County Urban Land Assembly Program. The remaining \$25,000,000 is expected to come from private sources. Nearly 400 tons per year of reduced CO<sub>2</sub> emissions are estimated from this one 8.5 acre project (135 residences x 2.7 tons/residence + 8.5 acres of greenfields preserved at 4 tons/acre).

**Multiple Benefits Anticipated (in addition to greenhouse gas reductions)**

Brownfield redevelopment represents an excellent opportunity for sustainable development, while limiting urban sprawl and preserving open farmland and green space. From a 2005 economic impact study performed by the University of Cincinnati's Economics Center for Education and Research, there is a resulting economic impact of \$34.6 million for every \$1 million invested in brownfield cleanup.

**Timeline for Implementation**

The City and Port Authority already have successful programs in place. These programs should continue to receive City support.

## Appendix VI

### Advocacy Task Team Recommendations

## Climate Protection Advocacy Task Team Climate Protection Summit

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation #1

Host a regional *Climate Protection Summit* for public sector and private sector policy makers as a way to coordinate climate protection activities, solicit buy-in from surrounding communities and provide tools and best practice ideas and initiatives.

#### Estimated Annual GHG Reduction

N/A

**Summary of specific issues** – The advocacy task force felt it most important to coordinate climate protection efforts throughout the region. As a first step, our task team is in the process of building an inventory of those initiatives already in place. The next step would be to share these initiatives and best practices with policy makers throughout the tri-state region by hosting a *Climate Protection Summit*.

#### **Strategy/action plan** –

- Inventory of existing climate protection initiatives and policies.
- Cull out best practices using recommendations from other task force teams
- Seek funding
- Host a *Climate Protection Summit* focusing on four topic areas; education, technology, ordinances, enforcement/incentives.
- Outcomes of the summit would include a next steps objective with an end goal of producing a regional action plan. A second outcome could include the formation of an *Envoy Team* to take the action plan to stakeholders.

**Implementation responsibilities/assignments** – The Climate Protection Summit will be organized by the Office of Environmental Quality, in conjunction with the Mayor's Office and the Hamilton County Commissioners

**Cost to implement/net savings from implementation** – Hosting a regional *Climate Protection Summit* would have minimal costs associated with its implementation, but could hold a great deal of potential for achieving our goal of reducing GHG emissions in our region. A well-coordinated regional plan that includes educating all sectors of our citizens on GHG reduction, its technologies, a thorough review of ordinances and policies that effect these technologies, and incentives for those willing to take the risks necessary to implement new technologies could have significant effects on the environment within our region.

#### **Multiple benefits anticipated (in addition to greenhouse gas reductions)** –

- Coordinating efforts which could reduce costs (economies of scale)
- Creating a consistent message
- Inviting competition among communities
- Sharing knowledge (what works and what doesn't)

#### **Timeline for implementation** –

May-Aug. – Summit planning  
 Sept. – Send out invitations  
 Nov. – Hold Summit

## Climate Protection Advocacy Task Team Marketing Plan

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation #2

Develop a *multi-layered marketing plan*. The objective of the plan is to produce environmentally conscious behavior through awareness, education and encouragement among all sectors of our city and region, including the leadership of corporations, business, government, health care, building and transportation sectors, faith-based groups, educational institutions, and ordinary citizens.

#### Estimated Annual GHG Reduction

N/A

**Summary of specific issues** – The advocacy task force felt it important to develop a comprehensive marketing and communications plan with complete strategies including but not limited to: a clear, concise brand, logo, informational website, and impactful campaigns and presentations that can be implemented with diverse media and throughout businesses, organizations, and institutions. *The advocacy team's recommendations will be based on the results of the research and suggestions provided from the other task teams.* With these results, the feasibility, costs and benefits can be assessed and prioritized.

**Strategy/action plan** – this will be an ongoing, multi-layered plan in progress. It will regularly be assessed for its effectiveness in terms of wide scale behavioral change resulting in lower carbon emissions and thus improved environmental quality.

The plan will address three primary audiences: the individual resident; businesses, including industrial and commercial organizations; and government/education located within our city and Hamilton County. Overlap among the audiences does exist and will be leveraged, i.e. practices learned in the workplace may be carried into the home and vice versa.

#### Pre-launch Strategy

- I. Conduct Market Research** - hold focus groups and/or community meetings to engage public and conduct SWOT (strength, weakness, opportunity, threats) Analysis
- II. Define Purpose, Mission and Outline Objectives** -incorporate market research and the specific quantifiable goals from task teams' recommendations
- III. Identify and Understand the Audience(s)** - demographics research and best venues for how to reach them - from billboards to in-class presentations in schools.
- IV. Develop Communications Messaging & Complete Branding Campaign** - positioning to effectuate multiple audiences through initiatives including: media, print, internet, events, presentations, email and more for accessing different target audiences
- V. Develop Strategic Action Plan for Implementation** -method, tools and action steps to meet budget and assign accountability
- VI. Build in Measurement Tools for Evaluation** - short term and long term, to assess what is working and what needs improvement

#### Post-launch Strategy

- I. Measurement and Evaluation**
- II. Monitor and Implement Changes (as necessary)**

Climate Protection Advocacy Task Team - Marketing Plan (continued)

**Implementation responsibilities/assignments** – the Office of Environmental Quality (OEQ) should determine the process. Once the reports are assembled from the individual task teams and steering committee, OEQ should conduct an assessment to determine feasibility, prioritize projects, establish timelines and budgets and assign responsibilities. OEQ should partner with the Cincinnati Chamber of Commerce, the Northern Kentucky Chamber of Commerce, the several local ethnic-based Chambers of Commerce, a local multimedia corporation, Keep Cincinnati Beautiful and Hamilton County Department of Environmental Services to develop the use of local marketing resources for assembling the plan and subsequent market campaign.

**Cost to implement/net savings from implementation** – to be determined with additional information from task teams

**Multiple benefits anticipated (in addition to greenhouse gas reductions) –**

- Potential to unite communities and build relationships among diverse groups
- Potential to help revitalize downtown Cincinnati and outlying areas
- Potential to attract new business and industry into the Cincinnati area
- Potential to reduce crime, reduce costs through economies of scale, enhance lifestyle through friendly community interaction, and develop a healthy city with flourishing neighborhoods

**Timeline for implementation – 2008**

- May – pre launch strategy outlined above
- Sept. – begin implementing plan with launching campaigns
- Dec. – begin monitoring and evaluating results

## Climate Protection Advocacy Task Team Public Education

### TASK TEAM WORK GROUP RECOMMENDATIONS

#### Recommendation # 3

Although public education is included in our marketing plan, the advocacy committee felt it an extremely important part of changing behavior and wanted to highlight climate protection education as a component of the plan.

#### Estimated Annual GHG Reduction

N/A

**Summary of specific issues** – A 2006 Pew Research Center survey found little consensus on the cause of global warming. While most people agreed that the earth was getting warmer, they did not agree on whether these changes were caused by “human activity” or “natural climate patterns”. The survey also found that 47% of people living in the United States expressed attitudes of little or no concern about the warming trend. Clearly there is an opportunity to provide education around this important issue.

**Strategy/action plan** – Following the research of P. Wesley Schultz in “Changing Behavior when there is no Crisis”, the strategy to change behavior needs to include 1) *Procedural Knowledge* - the “how to” 2) *Impact Knowledge* - the why and 3) *Normative Knowledge* or beliefs about the behaviors of other people in the community.

The Advocacy Committee suggests developing *Climate Protection Tool Kits* for Home, School, Work and Play that would take the recommendations from the four task team committees and put those recommendations to work.

#### **Estimated greenhouse gas reduction to be achieved** – N/A

**Implementation responsibilities/assignments** – The Office of Environmental Quality would be the coordinating arm of this project. Partnerships with other environmental education groups and corporate environmental point persons would make up a team that would work toward building these *Tool Kits*.

Once the *Tool Kits* are assembled the group would form Education Envoy Teams to disseminate the information contained within the kits. It would be ideal to model these teams similarly to the education model employed by the Cincinnati Earth Institute.

**Cost to implement/net savings from implementation** – Based on the cost of several *Tool Kits* assembled by Keep Cincinnati Beautiful the committee estimates spending \$15,000 - \$25,000 per kit.

#### **Timeline for implementation** –

- |                       |                                                                                  |
|-----------------------|----------------------------------------------------------------------------------|
| April – Aug. 2008     | – Secure funding                                                                 |
| Sept.                 | – Form <i>Climate Protection Tool Kit</i> work teams                             |
| Oct. 2008 – Feb. 2009 | – develop and finalize <i>Tool Kits</i>                                          |
| Feb. – March 2009     | – Form Climate Protection Envoy Teams for each <i>Tool Kit</i>                   |
| April 2009            | – Unveil the <i>Tool Kits</i> and begin the Climate Protection education program |



## Appendix VII

### Food Task Team Recommendations

## Climate Protection Food Task Team Reduced Meat Consumption

### TASK TEAM WORK GROUP RECOMMENDATIONS:

#### Recommendation: 1

Reduced consumption of meat in individual and institutional diets.

#### Estimated Annual GHG Reduction

26,400 tons CO2 in 2012; 52,800 tons in 2028

**Summary of specific issues** – A 2006 report by the United Nations' Food and Agriculture Organization (FAO), *Livestock's Long Shadow*, found that the production of animals for food is responsible for over 18% of the planet's greenhouse gas emissions. This is more than twice that of the office buildings and homes (8%) and nearly 40% more than transportation emissions (13%). This figure represents 9% of the planetary carbon dioxide emissions, 37% of the methane (mostly from livestock flatulence and waste matter) and 65% of the nitrous oxide; the latter two gases having 23 times and 296 times the global warming potentials of CO<sub>2</sub>.

The report concluded "The livestock sector emerges as one of the... most significant contributors to the most serious environmental problems, at every scale from local to global" and finds it must become a major policy focus.

A 2005 University of Chicago report, *Diet, Energy and Global Warming* found that the added burden of meat diets above plant based diets accounts for 6% of US total greenhouse gas emissions. The Standard American Diet (SAD), of which around 28% of the caloric intake is derived from meat, produced 1.485 metric tons CO<sub>2</sub> equivalent emissions (per person per year) more than an all plant based diet (a conservative figure). A red meat eater's mean diet increased this number to 2.52 tons CO<sub>2</sub>e. This is the equivalent difference between driving a sedan (Camry) and an SUV. A diet of just 20% meat produced an added GHG burden of 1 ton CO<sub>2</sub>e per person annually; this is the difference between a year of driving a standard sedan (Camry) and the highest efficiency hybrid (Prius).

With 80% of annual world deforestation connected to animal agriculture, an area the size of a football field is razed every second, a practice which has been termed "the 'hamburgerization' of our forests". A single SAD meal levels 55 square feet of rain forest.

**Strategy/action plan** – A public campaign to educate Cincinnatians about the environmental (and specifically the planetary warming) consequences of meat consumption. "Fight Global Warming, One Bite at a Time" or "Cooling the Earth... with my Fork!" campaigns could adorn busses, bumper stickers, t-shirts. Great Britain's Environment Agency is developing a set of "key environmental behaviour changes" to mitigate global warming which include promoting vegetarianism. There already is a movement in Europe, called "Meat Reducers," by which, along side recycling and bringing your own bag shopping, people are simply eating less meat to help the environment. Mark Rosengrant, of the International Food Policy Research Institute, expects to see "public relations campaigns – like that around cigarettes – focused on the reduction of meat consumption."

Programs in the schools not only will educate the students (and include materials to educate parents) but include meat reduction by cafeterias, including a meat free day once a week (in addition to "fish Fridays") and with vegetarian or vegan options every day. Cow's milk will be available but not automatically placed on trays, and soy milk also will be available. Accompanying the reduction in animal products will be reductions in consumption of carbohydrates and increased availability of fresh fruit and vegetables. Similar menu changes will occur at centers of detention and all City facilities. Other private captive eating institutions such as hospitals, sports facilities, restaurants etc. will be encouraged to adopt similar dietary changes.

Climate Protection Food Task Team - Reduced Meat Consumption (continued)

**Implementation costs/savings** – The school costs have been shown to be largely a one time expense of training the food preparators. Most of the food items are available through federal programs but must be specifically ordered. Ideally, many schools can begin germination/gardening/harvesting programs (like the Loveland School garden program) and actually supply some portion of the food prepared and served in the cafeterias. Similar costs/savings should be true for other institutions. Plant-based menus should actually cost less than meat-based menus, so, within a year or year two, these programs will save money. For statistical purposes the programs can be considered at least cost neutral by year three.

As the educational programs, for students, prisoners, city workers, and the public generally, depend on the commitment, these costs are difficult to estimate.

**Estimated greenhouse gas reduction to be achieved** – 26,400 tons by 2012 (10% reduction in meat consumption x 20% of the population and 100% reduction by 3% of the population x 1.6 tons/person); 52,800 tons by 2028 (20% reduction in meat consumption x 20% of the population and 100% reduction by 6% of the population x 1.6). The goal will be to have all Cincinnati residents, on average, eat meat one less day per week by 2012, which would be a 14% reduction in meat consumption. The projected GHG emission reductions are based on a more conservative forecast of actual behavior.

**Additional benefits anticipated** – Plant-based, reduced carbohydrate, fresh food eating programs at schools have been shown to reduce violence and inattention and increase focus, productivity and the pleasure of learning dramatically. The probability of similar results with prison populations, the general workforce and citizenry at large is likely and of inestimable value.

The benefit to human health of plant-based diets is now widely demonstrated and includes reducing cardiovascular diseases, hypertension, many common cancers, diverticular disease, other chronic diseases, diabetes, obesity, osteoporosis, arthritis, appendicitis, gall stones, kidney stones, food allergies and food poisoning. The associated economic benefits are massive. Psychic/spiritual benefits occur as well (when people feel more responsible for the lives of animals, they are less likely to disregard the lives of each other).

Deforestation will slow; a huge amount of water will be saved annually (eating four Whoppers consumes more water than a year's worth of showers). Plant-based protein and caloric sources are enormously more efficient than animal ones. The same land that can feed 100 people on grain will feed only 4 people if that grain is fed to cows and the people eat beef. As a meat eating country, Britain is unable to feed its own population; if it's agricultural land were used solely for plant-protein production, it could feed the entire US population.

Moving to a plant-based diet is a much quicker way to affect global cooling than most, as the turnover rate for farm animals (esp. factory produced animals) is much greater than that for cars, busses, planes, buildings, power plants etc. And, while CO<sub>2</sub> can remain in the air for more than a century, methane cycles out of the atmosphere in just eight years, producing a further potential for quicker planetary cooling.

**Timeline for implementation** – Implementation can begin as soon as political will dictates. Educational materials could be produced within months. School programs could be in place by the beginning of the school year 2008; other institutions programs could be as quick or take another six months to a year.

**Food for thought** – You can change your light bulbs, buy a hybrid car and plant more trees till the cows come home, but nothing is as effective, available, inexpensive, quick, powerful for the individual in affecting global warming as the choice of where to stick your fork. Former Sierra Club director and

Climate Protection Food Task Team - Reduced Meat Consumption (continued)

Greenpeace cofounder, Paul Watson, crunched the numbers and declared *a vegan driving a Hummer does less planetary greenhouse damage than a meateater riding a bicycle.*